

# STUDENT SUPPORT GUIDE

Alberta  
EDUCATION

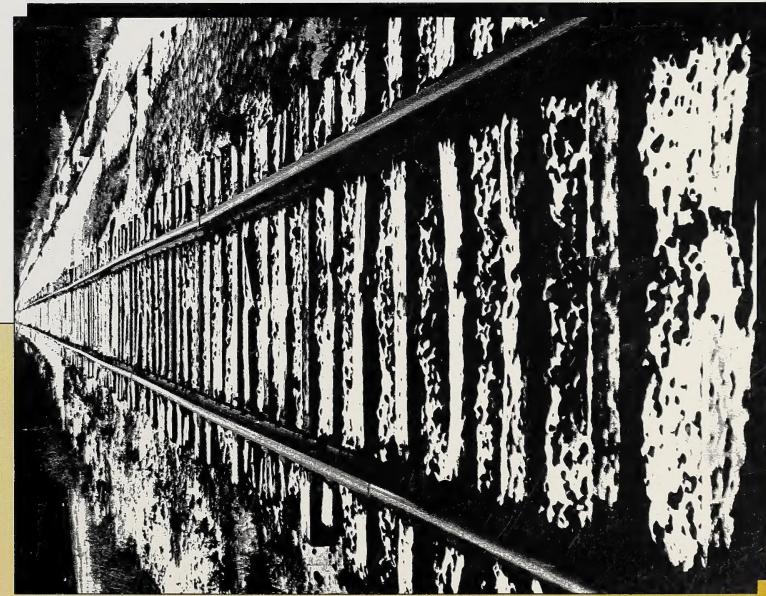


Distance  
Learning

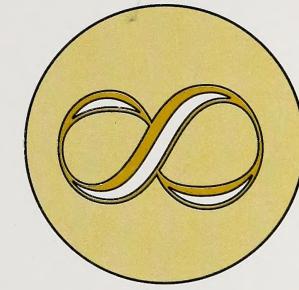


## MODULE 6

### MEASUREMENT AND GEOMETRY



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# MATHEMATICS

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# Mathematics 8

## Module 6: Measurement and Geometry

### STUDENT SUPPORT GUIDE

## Note

This Mathematics Learning Facilitator's Manual contains answers to teacher-assessed assignments and the final test; therefore, it should be kept secure by the teacher. Student's should not have access to these assignments or the final test until they are assigned in a supervised situation. The answers should be stored securely by the teacher at all times.

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**Mathematics 8**

**Student Support Guide**

**Module 6**

**Measurement and Geometry**

Alberta Distance Learning Centre

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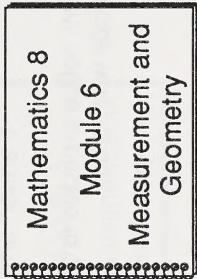
## MODULE INTRODUCTION

### What Lies Ahead

The Module Introduction gives the student an overview of Module 6.

### Gathering Materials

For this section the student needs these items.



### Guiding the Student

- Emphasize to the students that the goal of this module introduction is to preview the module and learn how it is evaluated.

- Discuss the learning process, time management, and evaluation with the students. See the suggestions on the next page.

## The Learning Process

Each section of Module 6 deals with a different skill involving measurement and geometry.

Sections have several activities.

- Introductory Activities
- Practice Activities
- Extra Practice
- Concluding Activities

Remind the students that they will not be expected to do all the activities. You will help them decide what to do.

## Time Management

Decide how long the student will need to complete the module. (The average student should spend about 9 weeks in a 40-week year to complete the module. It is recommended that students spend no more than 1 hour at a time doing mathematics.)

## Evaluation

Explain that the grade on Module 6 is based on work in the assignment booklet. The module booklet will help prepare students for the assignment booklet.

## KEEPING SKILLFUL

### What Lies Ahead

In this section the student will review these concepts.

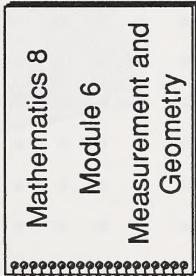
- slides, flips, and turns
- congruent figures
- similar figures
- flip and turn symmetry
- tiling
- tessellations
- geometric designs

### Gathering Materials

For this section the student needs these items.



ruler



### Guiding the Student

- Emphasize to the students that the goal of this section is to review previously-developed skills.

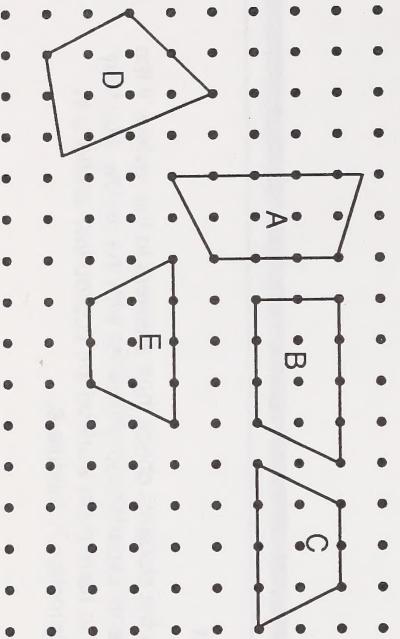
- Help the students check their answers to the review. If the students experienced difficulties with the review, you may wish to have them work on the appropriate sections in Mathematics 7, Module 6.

**Review****Suggested Answers**

1. What transformations (slides, turns, or flips) are suggested by the following activities?

- a. moving furniture into a new house
- b. playing both sides of a record
- c. resetting your watch
- d. raising a flag up a flag pole
- e. playing chess or checkers

2. Which of the following figures are congruent?



2. Figures C and E are congruent.

1. a. slides

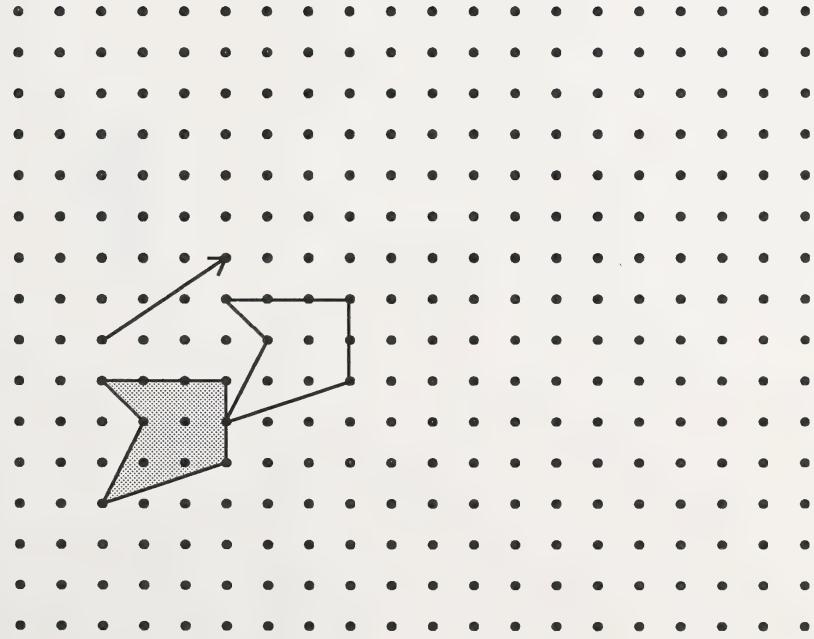
b. flips

c. turns

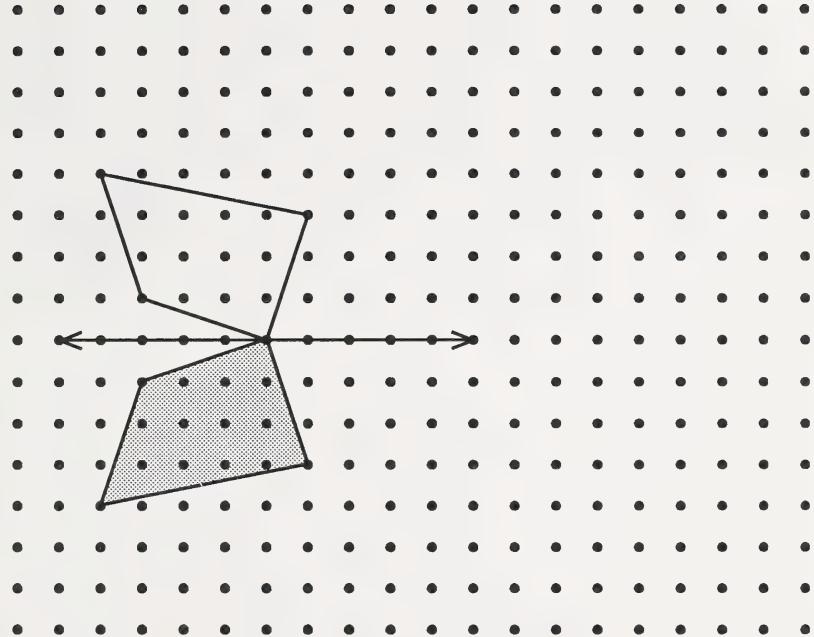
d. slides

e. slides

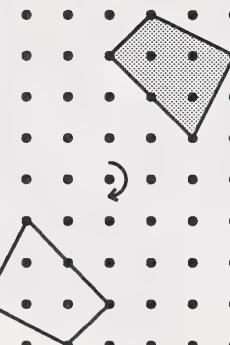
3. Draw the slide image for the given slide arrow. You may use the tracing paper provided in the Appendix.



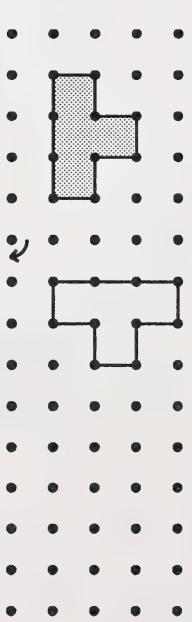
4. Draw the flip image for the given flip line. You may use the tracing paper provided in the Appendix.



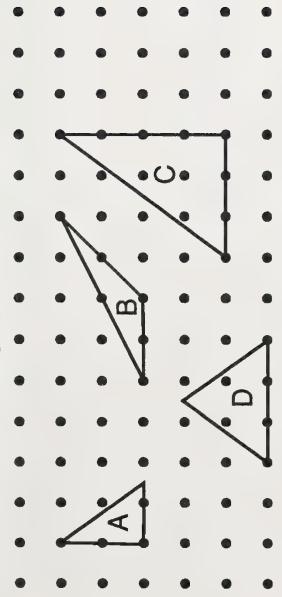
5. Draw the half-turn image for the given turn centre. You may use the tracing paper provided in the Appendix.



6. Draw the quarter-turn image for the given turn centre. You may use the tracing paper provided in the Appendix.



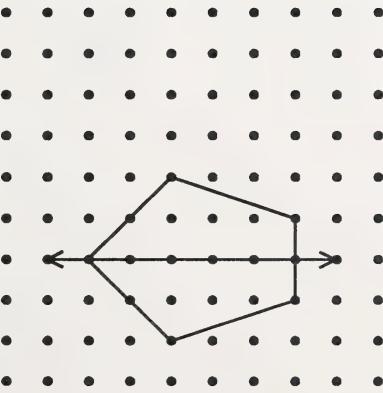
7. Which of the following figures are similar?



7. Figures A and C are similar.

8. For each of the following figures, indicate whether or not the lines shown are lines of symmetry.

a. 8. a. This is a line of symmetry.



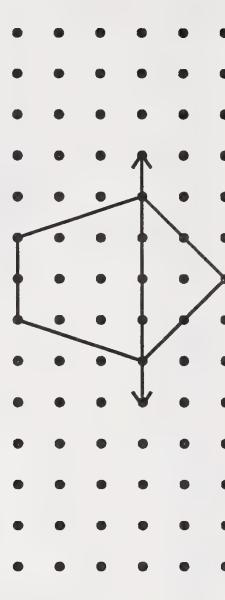
b. 

9. Which figure has a turn order of 2?

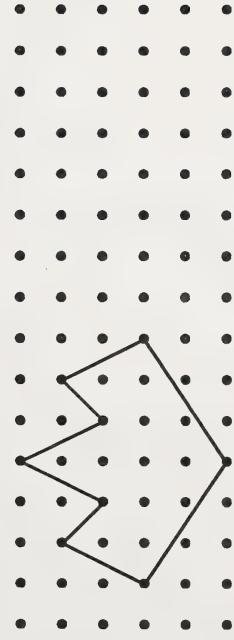
- 
- 
- 

10. How many different shapes are used to make this tiling pattern?

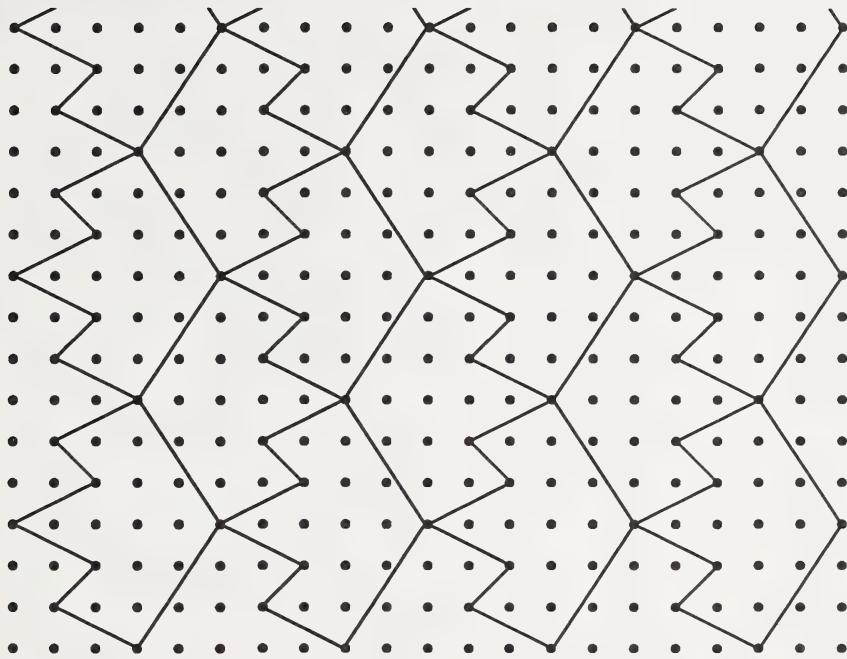
10. Only one shape is used.

b. This is not a line of symmetry. 

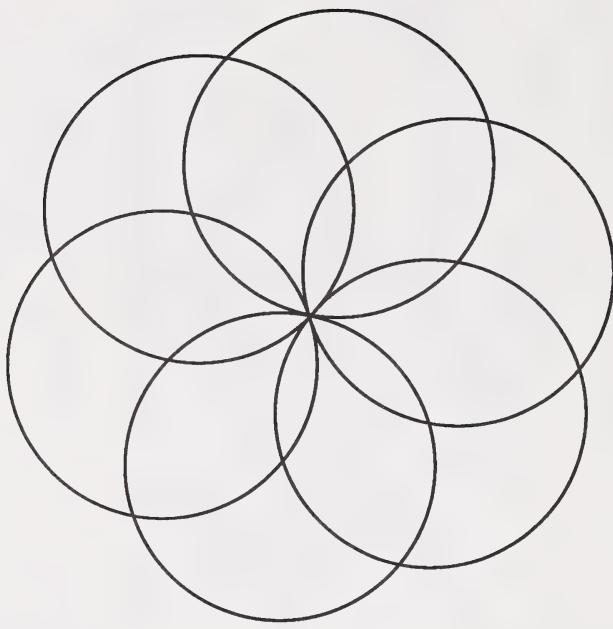
11. Create a tessellation with this shape. Use the dot paper provided at the right.



11.



12. Construct this design with a compass. You can make the design larger or smaller if you wish.

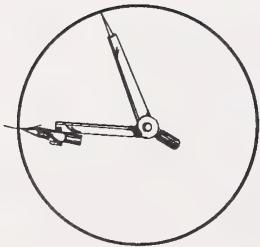


12. Students will use problem solving skills to discover how to draw this design. Here is one way to draw the design.

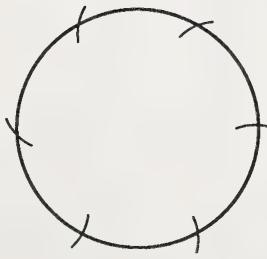
**Step 1:** Lightly draw a circle with a compass. This circle will later be erased.



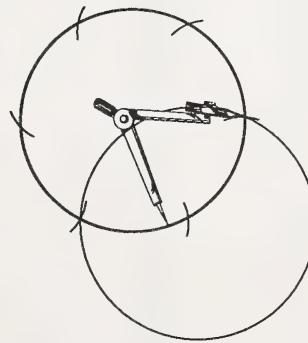
**Step 2:** Do not change the compass setting. Begin on any point on the circumference of the circle and make an arc that cuts the circle.



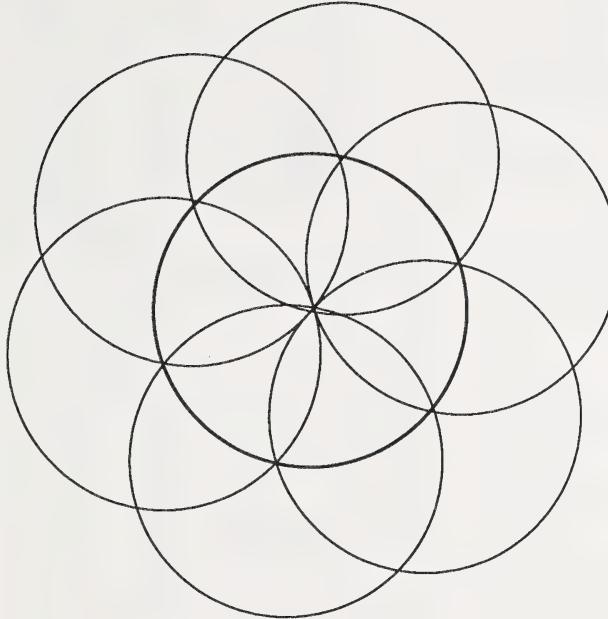
**Step 3:** Do not change the setting of the compass. Put the compass on the point where the arc cuts the circle and make another arc. Repeat this step until you have six arcs.



**Step 4:** Do not change the setting of the compass. Put the compass on the point where an arc cuts the circle. Draw a circle which connects two of the other arcs.



**Repeat Step 4 until six circles are drawn.**



**Step 5:** Erase the original circle.

#### Note

Some students will figure out how to draw the design, but will not have the coordination to actually draw the design. These students may simply need more practice using a compass. Other students will be able to use the compass, but will not see how to draw the design. They will need more practice in problem-solving.



## GETTING SET

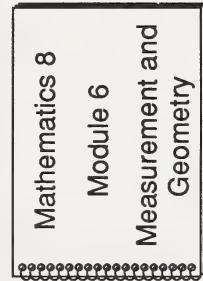
### What Lies Ahead

This section will pretest these skills.

- interpreting lines, rays, and line segments
- interpreting polygons
- classifying angles
- classifying lines
- classifying polygons according to number of sides and angles
- classifying triangles
- classifying quadrilaterals
- interpreting right rectangular prisms and cubes

### Gathering Materials

For this section the student needs these items.



### Guiding the Student

- Emphasize to the students that the goal of this section is to determine their strengths and weaknesses in geometry.

- Help the students check their answers to the pretest. It is not necessary for the students to correct errors at this time. See the last page of this section for further directions.

**Pretest****Suggested Answers**

1. Choose the best word to describe each of the following (e.g., ray, parallel, perpendicular, line segment, etc.).

1.

a. ray

a.

a. ray

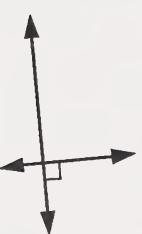


b.

line

c.

perpendicular lines



d.

line segment





e. parallel lines



f. intersecting lines

2. Choose the best word for each of the following angles (e.g., acute, obtuse, etc.).



a. straight angle



b. obtuse angle

c. acute angle



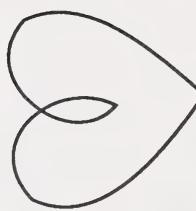
d.



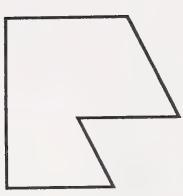
d. right angle

3. Which of the following figures are polygons? Explain why.

a.



b.



3. A polygon is a simple closed curve made up of line segments.

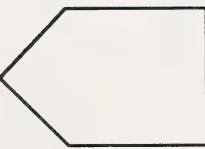
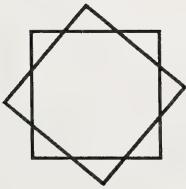
a. This figure is a non-simple closed curve, so it is not a polygon. This figure is not made up of line segments either.

b. This figure is a polygon because it is a simple closed figure, and it is also made up of line segments.

c. This figure is made up of line segments, but it is a non-simple closed curve.

d. This is not a polygon because it is not made up of line segments.

e. This is a polygon because it is a simple closed curve, and it is also made up of line segments.

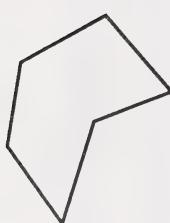


4. Choose the name that shows the number of sides and angles for the following figures.

a.



b.

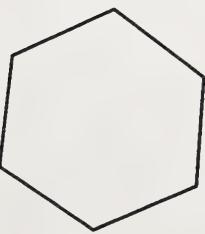


c.

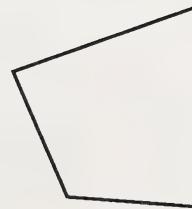
b. hexagon

c. triangle

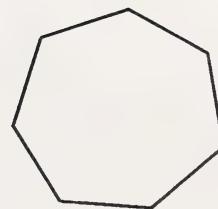
4. a. pentagon



d. hexagon



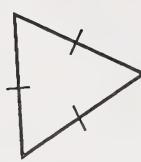
e. quadrilateral



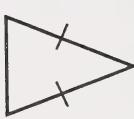
f. heptagon

5. Choose the best word to describe each of the following triangles.

a. equilateral triangle



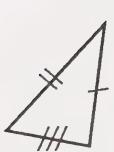
b. isosceles triangle



c. right triangle



d. scalene triangle



6. Choose the best name for each of the following polygons.



6. a. rectangle



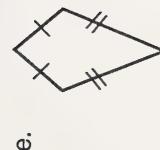
b. rhombus



c. trapezoid



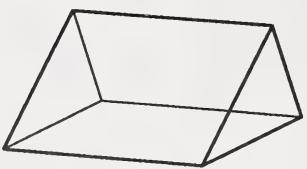
d. parallelogram



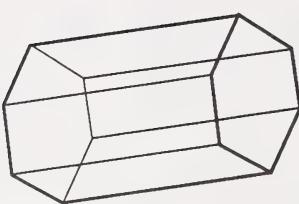
e. kite

7. Which of the following figures are right rectangular prisms?

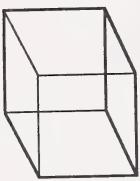
a.



b.



c.



7. a. This is not a right rectangular prism. (It is a right triangular prism; the bases are triangles.)

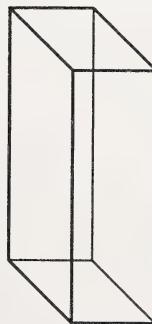
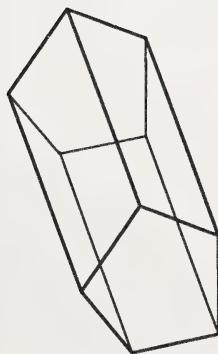
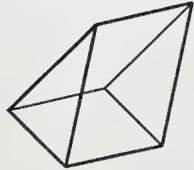
b. This is not a right rectangular prism. (It is a right hexagonal prism; the bases are hexagons.)

c. This is a right rectangular prism. All the faces are rectangles.

d. This is not a right rectangular prism. (It is a right triangular prism; the bases are triangles.)

e. This is not a right rectangular prism. (It is a right pentagonal prism; the bases are pentagons.)

f. This is a right rectangular prism. All the faces are rectangles.



8. Which of the right rectangular prisms in Question 7 is a cube?

8. The right rectangular prism in part 7. c. is a cube.

9. a. How many faces does a right rectangular prism have?

9. a. six

b. How many edges does a right rectangular prism have?

b. twelve

c. How many vertices does a right rectangular prism have?

c. eight

## Guiding the Student

Help the students decide what to do next. It is recommended that students review the notes in the sections which correspond to the questions in the pretest with which the students experienced success, and that the students do a few sample questions from the activities.

It is recommended that students carefully study the notes in the sections which correspond to the questions in the pretest with which students experienced difficulty, and that students do most of the questions in the activities.

Question	Skill	Section
1.	identifying rays, lines, and line segments	5
2.	identifying names of angles	4
3.	identifying polygons	3
4.	identifying names of polygons	6
5.	identifying names of triangles	7
6.	identifying names of quadrilaterals	8
7.	identifying right rectangular prisms	9
8.	identifying cubes	9
9.	identifying properties of right rectangular prisms	9



## POINTS, CURVES, AND LINE SEGMENTS

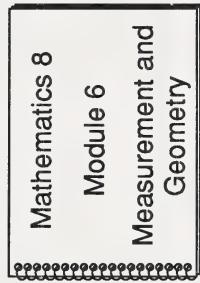
### What Lies Ahead

In this section the student will learn these skills.

- naming points, line segments, and curves
- indicating congruent segments

### Gathering Materials

For this section the student needs these items.



geoboard and elastics (optional)

### Guiding the Student

- Emphasize to the students the goal of this section.
- Help the students decide what to do.
- Help the students check their answers to the activities in this section and correct any errors.

**Introductory Activities****Suggested Answers**

1. Draw any design without lifting your pencil from the paper.  
You will have drawn a curve.
2. Which of the following curves can you trace without lifting your pencil from the paper? You may retrace or cross over a part you have already drawn.
  - a. 
  - b. 
  - c. 
  - d. 
  - e. 
3. Which of the curves in Question 2 did not have endpoints?

1. Answer will vary.

2. a. yes
- b. yes
- c. no
- d. no
- e. yes

4. Do either part a. or part b. of this question.

- Use a geoboard and elastics. Make as many different shapes as you can by joining five points with segments.
- Use the dot paper from the Appendix. Make as many different shapes as you can by joining five points with segments.

5. How are the shapes that you made in Question 4 different?

- a. Answers will vary.
- b. Answers will vary.

4. a. Answers will vary.  
b. Answers will vary.

5. Some shapes have crossovers and some do not.  
Some shapes have all the sides turning outward, and some shapes have sides that turn inward.

**Practice Activities****Suggested Answers**

1. Is each of the following curves a polygon? Why or why not?

a.



b.



c.



d.



e.



f.

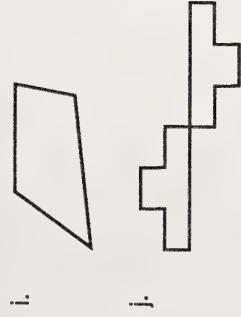


g.

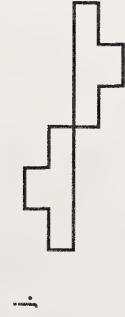




h. Yes, it is a closed curve, and it is made up of line segments.



i. Yes, it is a closed curve and it is made up of line segments.



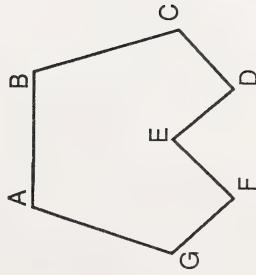
j. No, it has a cross over. Four line segment meet at one point.

2. Which of the polygons in Question 1 are convex polygons?

2. The polygons in parts b., f., h., and i. are convex polygons.

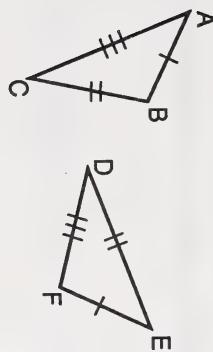
3. Name the sides adjacent to  $\overline{AB}$  in this polygon.

3.  $\overline{AG}$  and  $\overline{BC}$  are adjacent to  $\overline{AB}$ .

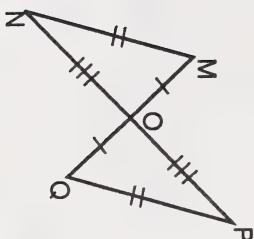


4. Complete the blanks at the right. Use slash marks to indicate congruent sides on the figures.

a.



b.



a.

$$\overline{AB} \cong \underline{\underline{\overline{EF}}}$$

$$\overline{AC} \cong \underline{\underline{\overline{ED}}}$$

$$\overline{BC} \cong \underline{\underline{\overline{FD}}}$$

b.

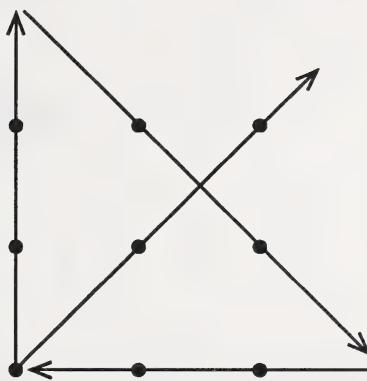
$$\overline{MO} \cong \underline{\underline{\overline{OQ}}}$$

$$\overline{MN} \cong \underline{\underline{\overline{PQ}}}$$

$$\overline{NO} \cong \underline{\underline{\overline{OP}}}$$

**Concluding Activities****Suggested Answers**

Connect all the points to the right with only four line segments. Do not lift your pencil and do not retrace any lines.





## RAYs AND ANGLES

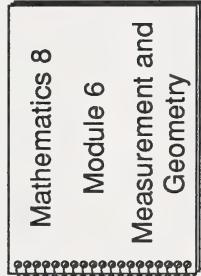
### What Lies Ahead

In this section the student will learn these skills.

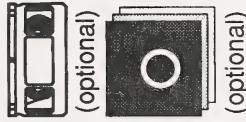
- naming angles
- measuring angles
- classifying angles
- indicating congruent angles

### Gathering Materials

In this section the student needs these items.



protractor  
ruler



(optional)

LOGO

(optional)

### Guiding the Student

- Emphasize to the students the goal of this section.
- Help the students decide what to do in this section.
- Help the students check their answers to the activities in this section and correct any errors.

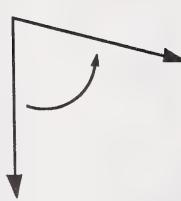
**Introductory Activities**

1. Measure the following angles with a protractor.

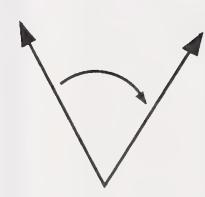
a.



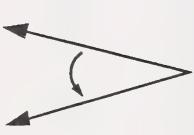
b.



c.



d.



1. a.  $45^\circ$

b.  $75^\circ$

c.  $60^\circ$

d.  $30^\circ$

**Suggested Answers**

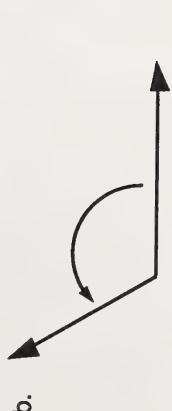
2. What do all the angles in Question 1 have in common?

2. They are all less than  $90^\circ$ .

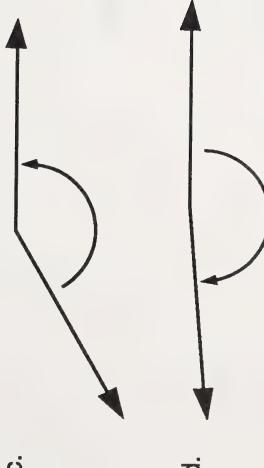
3. Measure the following angles.



3. a.  $135^\circ$



b.  $120^\circ$



c.  $150^\circ$



d.  $175^\circ$

4. What do all the angles in Question 3 have in common?

4. They are all greater than  $90^\circ$ .

**Practice Activities****Suggested Answers**

1. For each angle, tell whether it is a right angle, an acute angle, an obtuse angle, or a straight angle.

a.



b.



c.



d.



e.



1. a. obtuse angle

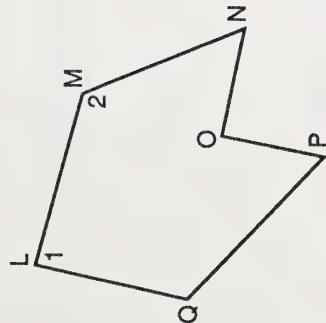
b. right angle

c. acute angle

d. straight angle

e. right angle

2. Give the measurements of the following angles in figure  $\triangle LMNOPQ$ .

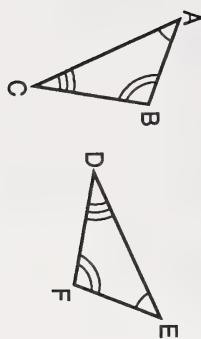


a.  $\angle 1$   
b.  $\angle Q$   
c.  $\angle 2$   
d.  $\angle QPO$   
e.  $\angle PON$   
f.  $\angle N$

2. a.  $86^\circ$   
b.  $238^\circ$   
c.  $53^\circ$   
d.  $57^\circ$   
e.  $90^\circ$   
f.  $305^\circ$

3. Complete the blanks at the right. Use arcs and slash marks to indicate congruent angles in the figures.

a.

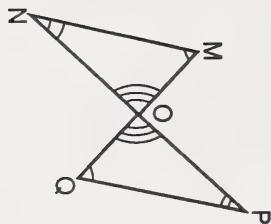


3. a.  $\angle A \cong \underline{\hspace{2cm}} \angle E$

$$\angle B \cong \underline{\hspace{2cm}} \angle F$$

$$\angle C \cong \underline{\hspace{2cm}} \angle D$$

b.



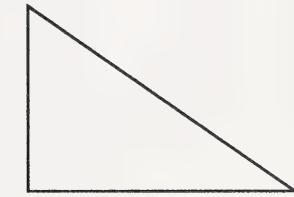
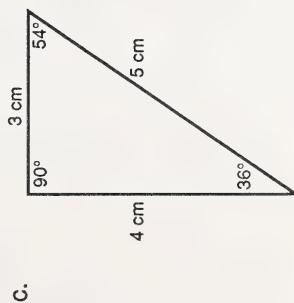
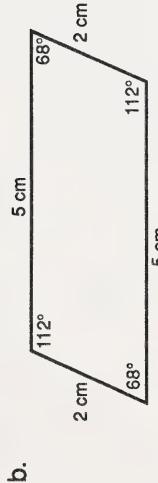
b.  $\angle M \cong \underline{\hspace{2cm}} \angle Q$

$$\angle N \cong \underline{\hspace{2cm}} \angle P$$

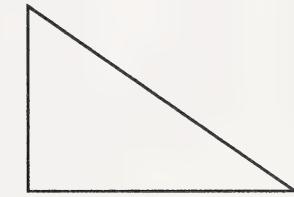
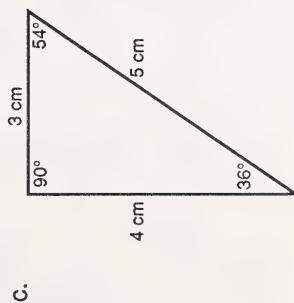
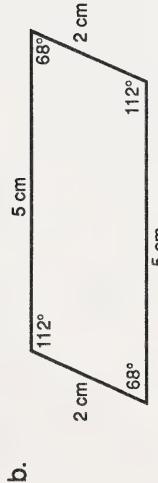
$$\angle MON \cong \underline{\hspace{2cm}} \angle POQ$$

**Concluding Activities****Print Alternative**

1. Use a protractor and ruler to make figures that are congruent to the following figures.

**Suggested Answers****Suggested Answers**

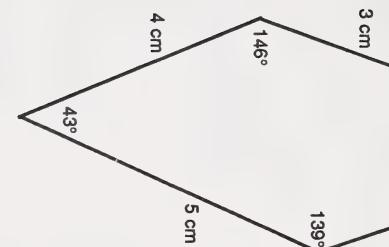
1. Use a protractor and ruler to make figures that are congruent to the following figures.



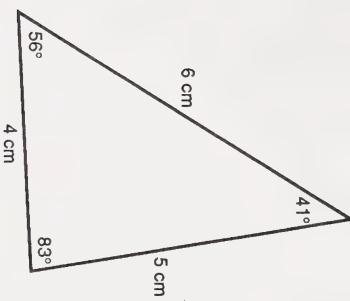
d.



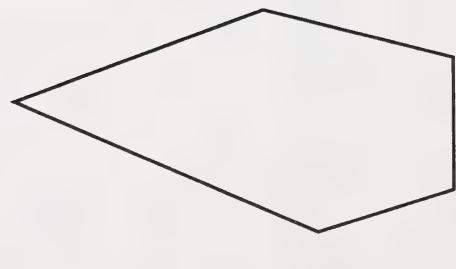
d.



e.

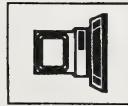


e.



**Computer Alternative**

2. Use LOGO to draw figures similar to the ones in Question 1.

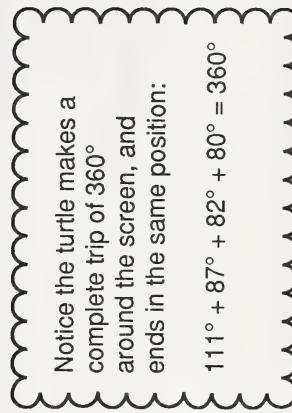
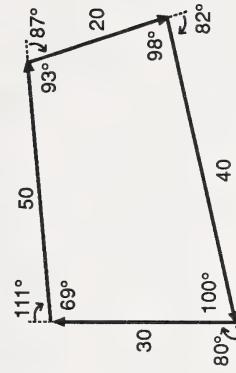


2.

**Note**

Students will discover that they can draw figures similar to those in Question 1 using commands RT and FD. For example, the following commands can be used to draw a figure similar to the one in part a.

```
FD 30  
RT 111  
FD 50  
RT 87  
FD 20  
RT 82  
FD 40  
RT 80
```



Notice the turtle makes a complete trip of  $360^\circ$  around the screen, and ends in the same position:

$$111^\circ + 87^\circ + 82^\circ + 80^\circ = 360^\circ$$



# LINES

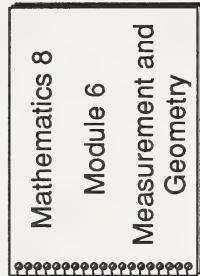
## What Lies Ahead

In this section the student will learn these skills.

- classifying pairs of lines
- indicating parallel lines
- indicating perpendicular lines

## Gathering Materials

For this section the student needs these items.



protractor  
ruler

## Guiding the Student

- Emphasize to the students the goal of this section.
- Help the students decide what to do in this section.

- Help the students check their answers to the activities in this section and correct any errors.

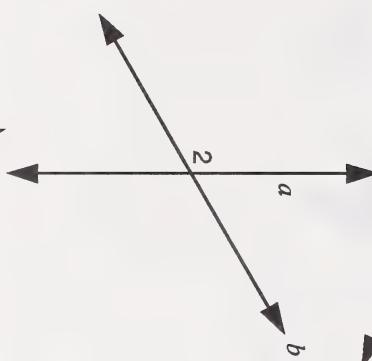
**Introductory Activities****Suggested Answers**

1. What are the measures of  $\angle 1$ ,  $\angle 2$ , and  $\angle 3$  in the following questions?

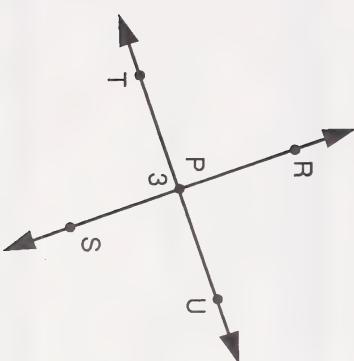
a.



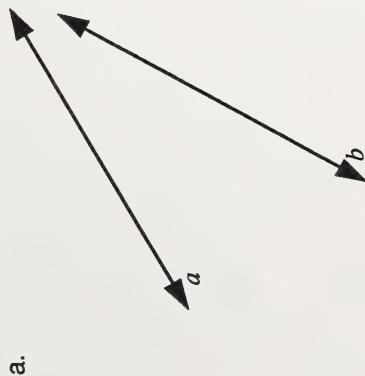
b.

1. a.  $\angle 1 = 30^\circ$ b.  $\angle 2 = 120^\circ$ 

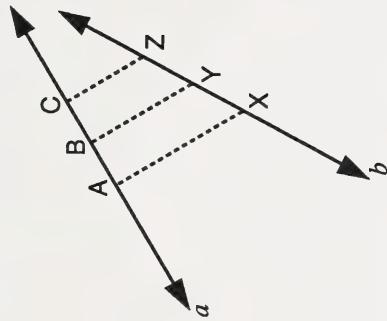
c.

c.  $\angle 3 = 90^\circ$ 

2. If you extended the following lines, do you think they will cross? Why or why not?



2. a. Lines  $a$  and  $b$  will cross eventually because the vertical distance between the opposite points on the lines are decreasing.



b. Lines  $m$  and  $n$  will never cross because the vertical distance between opposite points on the lines are the same.



**Practice Activities****Suggested Answers**

1. Which of the following letters contain parallel lines?

1.

a. yes

**E**

b.

**V**

b. no

c.

**N**

c. yes

d.

**Z**

d. yes

e.

**H**

e. yes

2. Which of the following letters contain perpendicular lines?

a. E

b. V

c. N

d. Z

e. H

2. a. yes

b. no

c. no

d. no

e. yes

3. Which of the following figures have parallel sides? Label the sides that are parallel.

a.



b.



c.



d.



3. a. no pairs of parallel sides

b. one pair of parallel sides

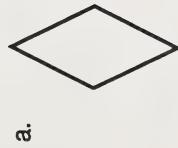


c. three pairs of parallel sides



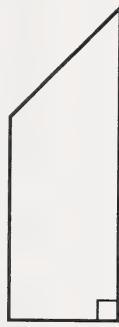
d. no pairs of parallel sides

4. Which of the following figures have perpendicular sides?  
Label the sides that are perpendicular.



4. a. no pairs of perpendicular sides

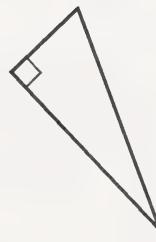
b. one pair of perpendicular sides



c. two pairs of perpendicular sides



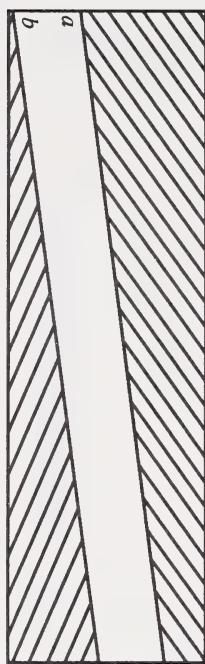
d. one pair of perpendicular sides



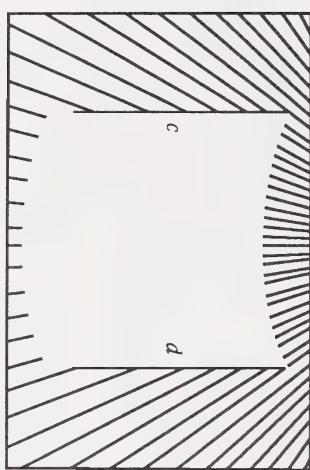
**Concluding Activities**

1. Things are not always what they appear to be.

a. Are lines  $a$  and  $b$  parallel?



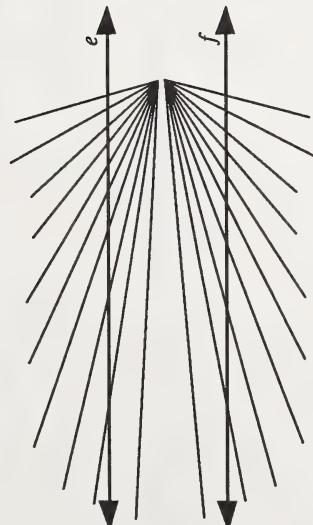
b. Are lines  $c$  and  $d$  parallel?

**Suggested Answers**

1. a. yes

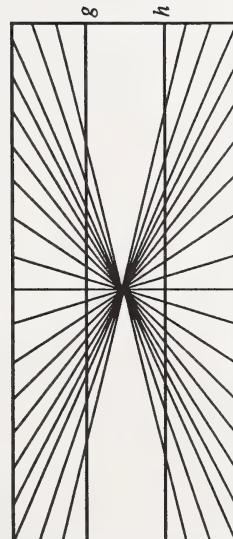
b. yes

c. Are lines  $e$  and  $f$  parallel?



c. yes

d. Are lines  $g$  and  $h$  parallel?



d. yes

2. Create your own optical illusion.

2. Answers will vary.



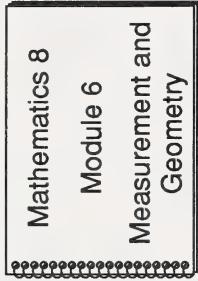
# POLYGONS

## What Lies Ahead

In this section the student will classify polygons according to the number of sides and angles.

## Gathering Materials

For this section the student needs these items.



scissors



(optional)

## Guiding the Student

- Emphasize to the students the goal of this section.
- Help the students decide what to do in this section.
- Help the students check their answers to the activities in this section and correct any errors.

**Introductory Activities**

1. What characteristics do these polygons share?



2. What characteristics do these polygons share?



3. What characteristics do these polygons share?



3. They all have four sides.

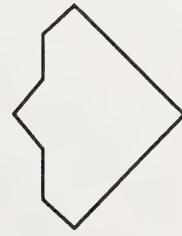
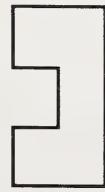
**Suggested Answers**

1. They all have five sides.

2. They all have three sides.

4. What characteristics do these polygons share?

4. They all have eight sides.



**Practice Activities**

1. Match the following figures with their names.

1.

a.



b.



c.



d.



e.



f.



g.



h.

**Suggested Answers**

g triangle

d quadrilateral

a pentagon

b hexagon

h octagon

e nonagon

c decagon

2. Which of the figures in Question 1 are regular polygons?

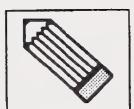
2. Figures b, g, and h are regular polygons.

**Note**

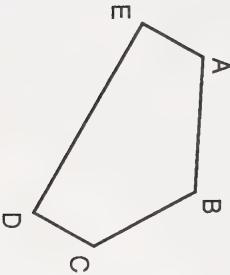
Figure d. has congruent sides, but not congruent angles.

**Concluding Activities****Computer Alternative**

1. Do the program "Diagonals" in *Problem Solving Strategies* (MECC).

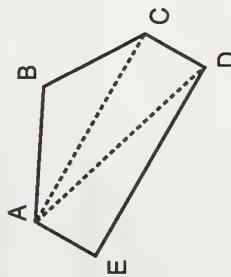
**Suggested Answers****Print Alternative**

2. The vertices of a polygon are referred to as **adjacent vertices** and **non-adjacent vertices**. Adjacent vertices are next to each other. Non-adjacent vertices are not next to each other. Name the vertices that are adjacent to A.



1. Computer corrected  
2. B and E are adjacent to A.

3. A **diagonal** is a line segment joining two non-adjacent vertices in a polygon. For example, in figure ABCDE, there are two diagonals from A.



3. a. two  
b. five

a. How many diagonals are there from B?

b. How many diagonals are there in polygon ABCDE in total? Do not count the same segment twice.

4. a. Complete the following table. Use the polygons in the Appendix to help you.

Kind of Polygon	Number of Sides	Number of Diagonals
triangle		
quadrilateral		
pentagon		
hexagon		

4. a. Pattern  
b. Pattern

Number of Sides	Number of Diagonals
3	0
4	2
5	5
6	9
7	14
8	20
9	27
10	35

b. Can you see a pattern in part a.? Explain the pattern.

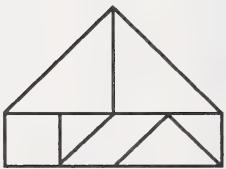
c. Use the pattern to find the number of diagonals in a decagon. Do not use a drawing or count the diagonals.

A decagon has 35 diagonals.

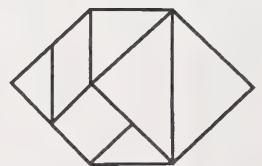
5. Use all the seven tangram pieces in the Appendix to form the following polygons.

5. a.

- a. a pentagon
- b. a hexagon



b.



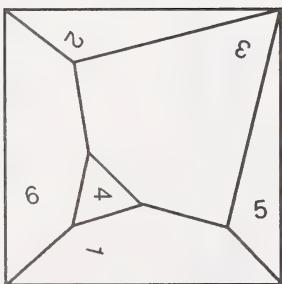
6.

A polygon with twelve sides and angles is called a **dodecagon**. Use all six pieces of the regular dodecagon in the Appendix to form a square.

**Note**

Students will need the tangram pieces again in Section 8. They should put the pieces in an envelope and save them.

6.



# TRIANGLES

## What Lies Ahead

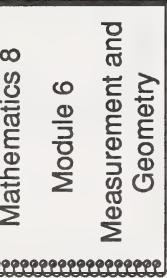
In this section the student will learn this skill.

- classifying triangles

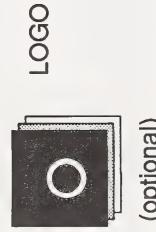
The student will also investigate the properties of triangles

## Gathering Materials

For this section the student needs these items.



protractor  
MIRA  
ruler



LOGO

(optional)

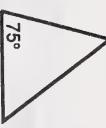
## Guiding the Student

- Help the students check their answers to the activities in this section and correct any errors.
- Emphasize to the students the goal of this section.
- Help the students decide what to do.

**Introductory Activities****Suggested Answers**

Questions 1 to 4 require you to use the triangles from the Appendix.

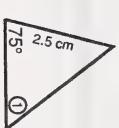
1. Use your protractor to carefully measure the angles in each of the triangles. Write the measure inside each angle.



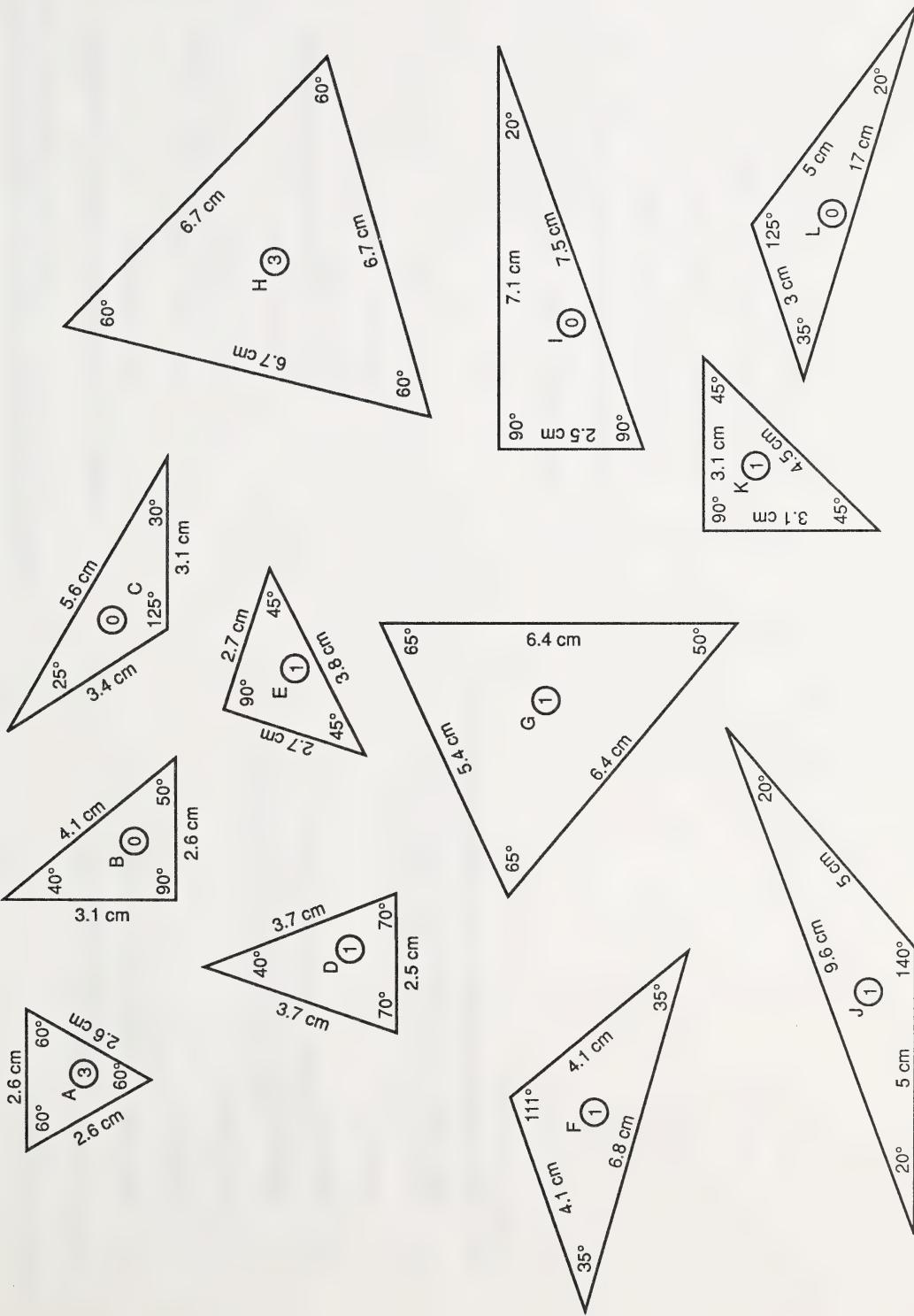
2. Measure the lengths of the sides of the triangles. Write the measures along the inside of the triangles.



3. Cut out each triangle and fold it (or use a MIRA) to determine the number of lines of symmetry. Put this number in the inside of the triangle.



See the next page for answers to Questions 1 to 3.



4. Sort the triangles into groups using the following criteria and record the triangles in each group.

a. classification of largest angle (acute, right, obtuse)

4. a. A, D, G, H are acute triangles.  
B, E, I, and K are right triangles.  
C, F, J and L are obtuse triangles.

b. number of equal sides (0, 2, 3)

b. A and H have three congruent sides.  
D, E, F, G, J, and K have two congruent sides.

c. number of lines of symmetry (0, 1, 3)

c. A and H have three lines of symmetry.  
D, E, F, G, J, and K have one line of symmetry.

B, C, F, and L have no lines of symmetry.

**Practice Activities****Suggested Answers**

1. Match the type of triangle with its description.

- a. equiangular
- b. right-angled
- c. acute-angled
- d. obtuse-angled
- e. equilateral
- f. isosceles
- g. scalene

- 1. f two equal sides
- a three equal angles
- e three equal sides
- d one obtuse angle
- g no equal sides
- c three acute angles
- b one  $90^\circ$  angle

2. Six triangles have the following measurements. Classify each triangle in two ways.

- a.  $40^\circ, 60^\circ, 80^\circ$
- b.  $60^\circ, 60^\circ, 60^\circ$
- c.  $45^\circ, 90^\circ, 45^\circ$
- d.  $120^\circ, 40^\circ, 20^\circ$
- e.  $40^\circ, 40^\circ, 100^\circ$
- f.  $30^\circ, 60^\circ, 90^\circ$

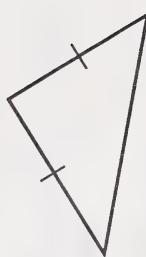
- 2. a. acute triangle, scalene triangle
- b. equiangular triangle, equilateral triangle
- c. right triangle, isosceles triangle
- d. obtuse triangle, scalene triangle
- e. obtuse triangle, isosceles triangle
- f. right triangle, scalene triangle

3. Classify each of the triangles in two ways.

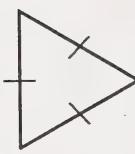
a.



b.



c.



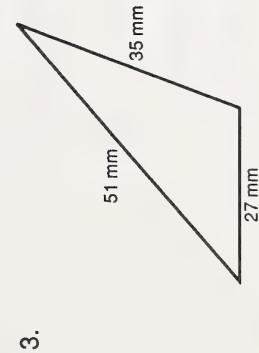
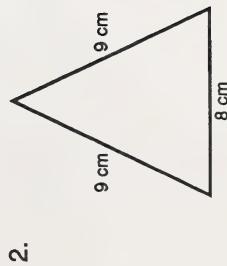
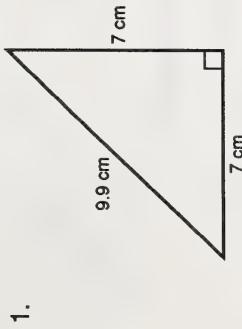
3. a. right triangle, scalene triangle

b. acute triangle, isosceles triangle

c. equiangular triangle, equilateral triangle

**Extra Practice**

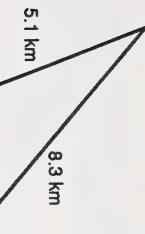
Classify each triangle two ways.

**Suggested Answers**

1. right triangle, isosceles triangle
2. acute triangle, isosceles triangle
3. obtuse triangle, scalene triangle

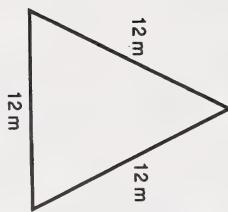
4.

obtuse triangle, isosceles triangle



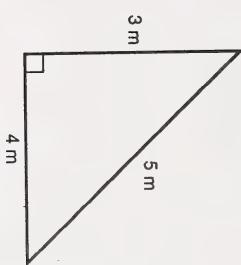
5.

equilangular triangular, equilateral triangle



6.

right triangle, scalene triangle



## Concluding Activities

### Print Alternative



### Suggested Answers

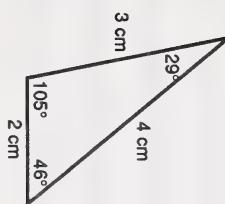
### Print Alternative

1. Can a triangle be both of the following? Show why or why not.
  - a. scalene and obtuse
  - b. equilateral and obtuse
  - c. scalene and right
  - d. isosceles and right
  - e. isosceles and equiangular
  - f. equilateral and acute
  - g. scalene and isosceles
1. a. Yes, Question 3 in Extra Practice is scalene and obtuse.  
b. No, a triangle that is equilateral has three  $60^\circ$  angles.  
c. Yes, Question 6 in Extra Practice is scalene and right.  
d. Yes, Question 1 in Extra Practice is isosceles and right.  
e. No, an isosceles triangle has only two congruent angles.  
f. Yes, Question 5 in Extra Practice is equilateral and acute.  
g. No, scalene triangles have no sides congruent, and isosceles triangles have two sides congruent.
2. Can a triangle have these characteristics? Show why or why not.
  - a. two right angles
  - b. two obtuse angles
  - c. exactly two lines of symmetry
2. a. No, two right angles won't join to form a triangle.  
b. No, two obtuse angles won't join to form a triangle.  
c. No, scalene triangles have no lines of symmetry, isosceles triangles have one line of symmetry, and equilateral triangles have three lines of symmetry.

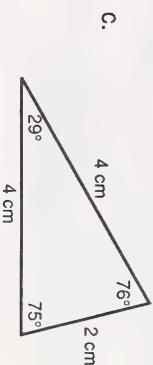
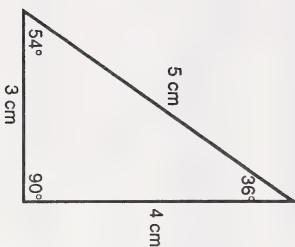
3. For each triangle, do the following.

- List the angle measures in order of size from smallest to largest.
- List the lengths of the sides in order from smallest to largest.

a.



b.



3. a.  $29^\circ, 46^\circ, 105^\circ$

2 cm, 3 cm, 4 cm

b.  $36^\circ, 54^\circ, 90^\circ$

3 cm, 4 cm, 5 cm

c.  $29^\circ, 75^\circ, 76^\circ$

2 cm, 4 cm, 4 cm

4. Did you discover a pattern in Question 3? What seems to be the relationship between the measure of each angle and the length of the side opposite the angle?

5. For each triangle in Question 4, list the measure of the longest side and the sum of the measures of the other two sides.

6. a. What pattern did you notice in Question 5?  
b. Do you think a triangle can have sides that measure 3 cm, 4 cm, and 7 cm? Show why or why not.

4. The longest side is opposite the largest angle. The smallest side is opposite the smallest angle.

5. a. 4 cm, 5 cm  
b. 5 cm, 7 cm  
c. 4 cm, 6 cm

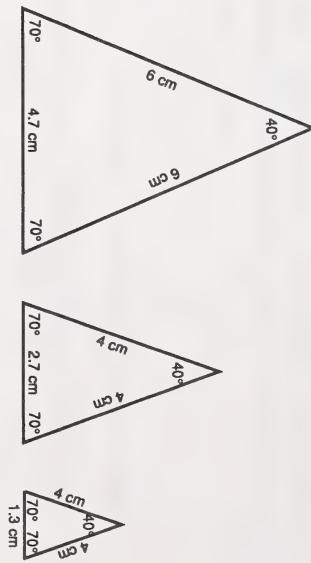
6. a. In each triangle the length of the longest side is less than the sum of the lengths of the two other sides.  
b. No, a triangle cannot have these measures. The sides will not join. The length of the longest side must be less than the sum of the lengths of the other two sides.

7. Use a protractor and a ruler to draw each of the following figures.

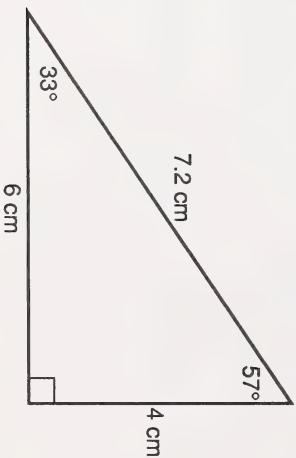
a. an isosceles triangle with two  $70^\circ$  angles

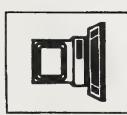
b. a right triangle with the two smaller sides measuring 4 cm and 6 cm

7. a. Many triangles can be drawn to fit this description. Here are three.



b. Only one triangle can be drawn to fit this description.



**Computer Alternative**

8. Draw triangles similar to those described in Question 7 on a computer using LOGO.

8. Because all the measurements are not given, students will probably want to draw the figures on paper first and measure the angles and sides that are not given.

a. Here is how to draw a triangle that fits this description.

```
FD 60
RT 140
FD 60
RT 110
FD 47
RT 110
```

140° 40° 60 70° 110° 70° 47

Notice the turtle does a complete trip of 360° around the screen.  
 $140^\circ + 110^\circ + 110^\circ = 360$

b. Here is how to draw a triangle that fits this description.

```
FD 60
RT 90
FD 40
RT 123
FD 72
RT 147
```

90° 40 57° 123° 60 72 33° 147°

**Note**

Students may wish to draw triangles similar to those on the Appendix page on the computer.



# QUADRILATERALS

## What Lies Ahead

In this section the student will learn this skill.

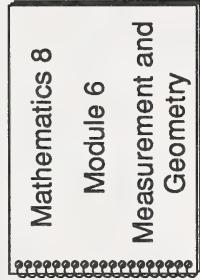
- classifying quadrilaterals

The student will also investigate the properties of quadrilaterals.

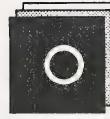
## Gathering Materials

For this section the student needs these items.

MIRA  
protractor  
ruler



LOGO



(optional)

## Guiding the Student

- Emphasize to the students the goal of this section.
- Help the students decide what to do in this section.

- Help the students check their answers to the activities in this section and correct any errors.

**Introductory Activities****Suggested Answers**

Questions 1 to 3 require you to use the quadrilaterals from the Appendix.

1. a. Do the following for each of the quadrilaterals.
  - Measure the sides and write the measures inside the figure.
  - Indicate the congruent sides.
  - Measure the angles and indicate their measures in the figure.
  - Indicate the right angles with the symbol  $\perp$ .
  - Identify the parallel sides and indicate them with the symbols  $\Rightarrow$  or  $\nRightarrow$ .
1. a. See the next page for answers.

b. Identify the quadrilaterals that have at least one pair of parallel sides.

c. Identify the quadrilaterals that have two pairs of parallel sides.

d. Identify the quadrilaterals that have congruent opposite sides.

e. Identify the quadrilaterals that have four congruent sides.

f. Identify those figures that have four right angles.

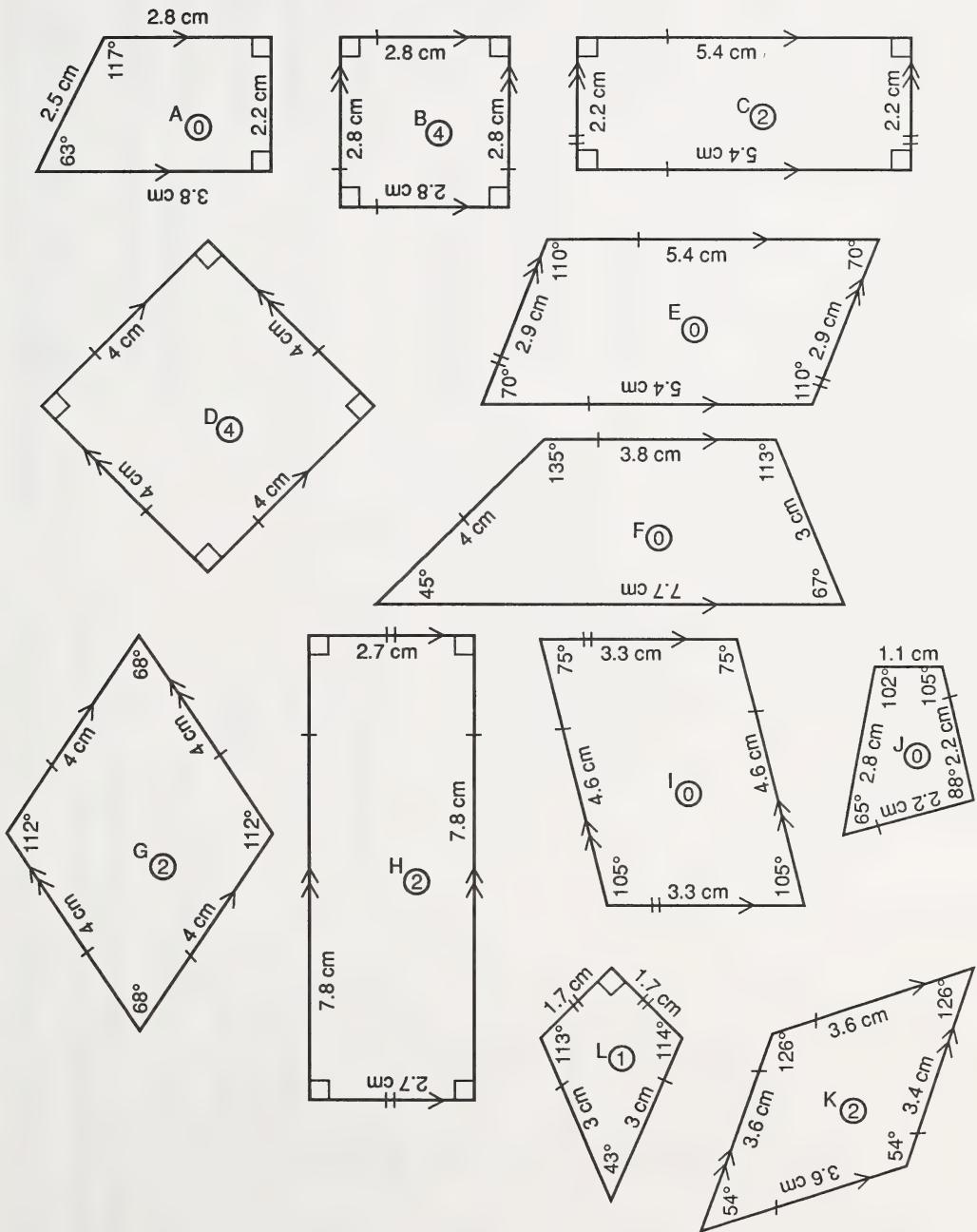
b. Figures A, B, C, D, E, F, G, H, I, and K all have at least one pair of parallel sides.

c. Figures B, C, D, E, G, H, I, and K have two pairs of parallel sides.

d. Figures B, C, D, E, G, H, I, and K have congruent opposite sides.

e. Figures B, D, G, and K have four congruent sides.

f. Figures B, C, D, and H have four right angles.



2. Cut out each figure that you examined in Question 1 and fold it (or use a MIRA) to determine the number of lines of symmetry. Put this number inside each quadrilateral.

3. Which figures have the following characteristics?

- a. no lines of symmetry
- b. one line of symmetry
- c. two lines of symmetry
- d. four lines of symmetry

2. See the answers on the previous page.

3. a. Figures A, E, F, I, and J

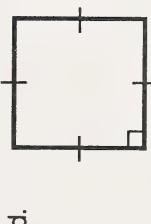
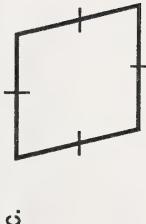
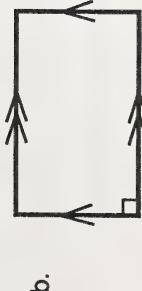
b. Figure L

c. Figures C, G, H, and K

d. Figures B and D

**Practice Activities****Suggested Answers**

1. Give two names that could be used for each of the following figures. Underline the one that best describes the figure.



1. a. trapezoid, parallelogram

b. parallelogram, rectangle

c. parallelogram, rhombus

d. rectangle, square

2. a. How is a square different from a rhombus?  
b. How are they similar?

3. Give the number of lines of symmetry for each figure.

- trapezoid
- parallelogram
- rectangle
- rhombus
- square
- kite

4. Answer yes or no to these questions.

- Is every rhombus a parallelogram?
- Is every square a rectangle?
- Is every parallelogram a rectangle?
- Is every rectangle a parallelogram?
- Is every square a rhombus?
- Is every rhombus a square?
- Is every rectangle a square?
- Is every trapezoid a parallelogram?

2. a. A square has four right angles.  
b. All four sides are congruent and there are two pairs of parallel sides.

3. a. zero  
b. zero  
c. two  
d. two  
e. four  
f. one

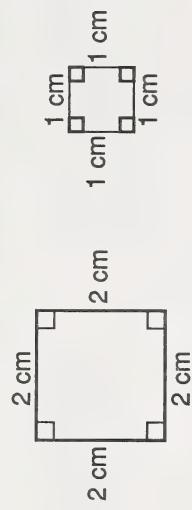
4. a. yes  
b. yes  
c. no  
d. yes  
e. yes  
f. no  
g. no  
h. no

5. Which quadrilaterals have congruent opposite angles and congruent opposite sides?

5. parallelograms, rectangles, rhombuses, squares.

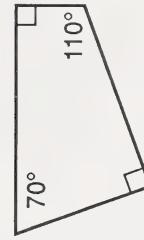
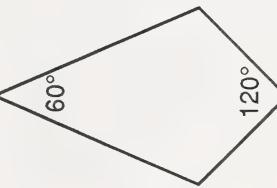
6. Draw (if possible) the quadrilaterals that have these characteristics.

- a. at least one right angle and four congruent sides
- b. exactly two right angles and no parallel sides
- c. exactly one right angle and one pair of parallel sides



7. Name the quadrilaterals that you drew in Question 6.

6. a. Several quadrilaterals that fit this shape can be drawn. Here are two.



c. No quadrilaterals can be drawn to fit this description.

7. All the quadrilaterals in part a. are squares.

Some of quadrilaterals in part b. are kites. The rest are simply quadrilaterals.

**Suggested Answers**

See the following page for answers.

**Extra Practice**

Complete the puzzle on the following page.<sup>1</sup>

---

<sup>1</sup>Creative Publications for excerpt from MIDDLE SCHOOL MATH WITH PIZZAZZ! BOOK D ©1989, Sunnyvale, California 94086

## Why Didn't the Snobbish Potatoes Want Their Daughter to Marry a News Broadcaster?

Under each figure, circle the number-letter combination next to each word that correctly names the figure. Write the letter in the matching numbered box at the bottom of the page.



5-A parallelogram  
16-O rectangle  
19-F square

25-E parallelogram  
13-I rectangle  
4-D rhombus

20-N parallelogram  
11-T rectangle  
23-A square

2-E quadrilateral  
24-V parallelogram  
8-P rhombus

19-O quadrilateral  
15-L rectangle  
6-S rhombus

13-A quadrilateral  
26-R parallelogram  
7-N trapezoid

21-E parallelogram  
18-I rhombus  
8-J trapezoid

4-W quadrilateral  
12-O parallelogram  
24-N trapezoid

17-M rectangle  
10-P square  
14-S trapezoid

10-S rectangle  
18-M rhombus  
24-T square

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
H	E	W	A	S	T	J	U	S	T	A	C	O	M	M	O	N	A	T	E	T	A	R	R		

## Suggested Answers

### Concluding Activities

#### Computer Alternative

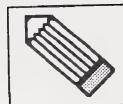
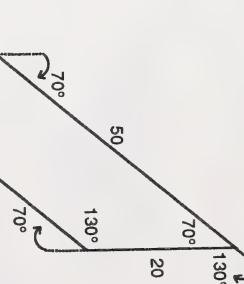
- Draw different kinds of quadrilaterals on the computer using LOGO.



#### Print Alternative

Questions 2 to 5 require you to use the quadrilaterals from the Appendix.

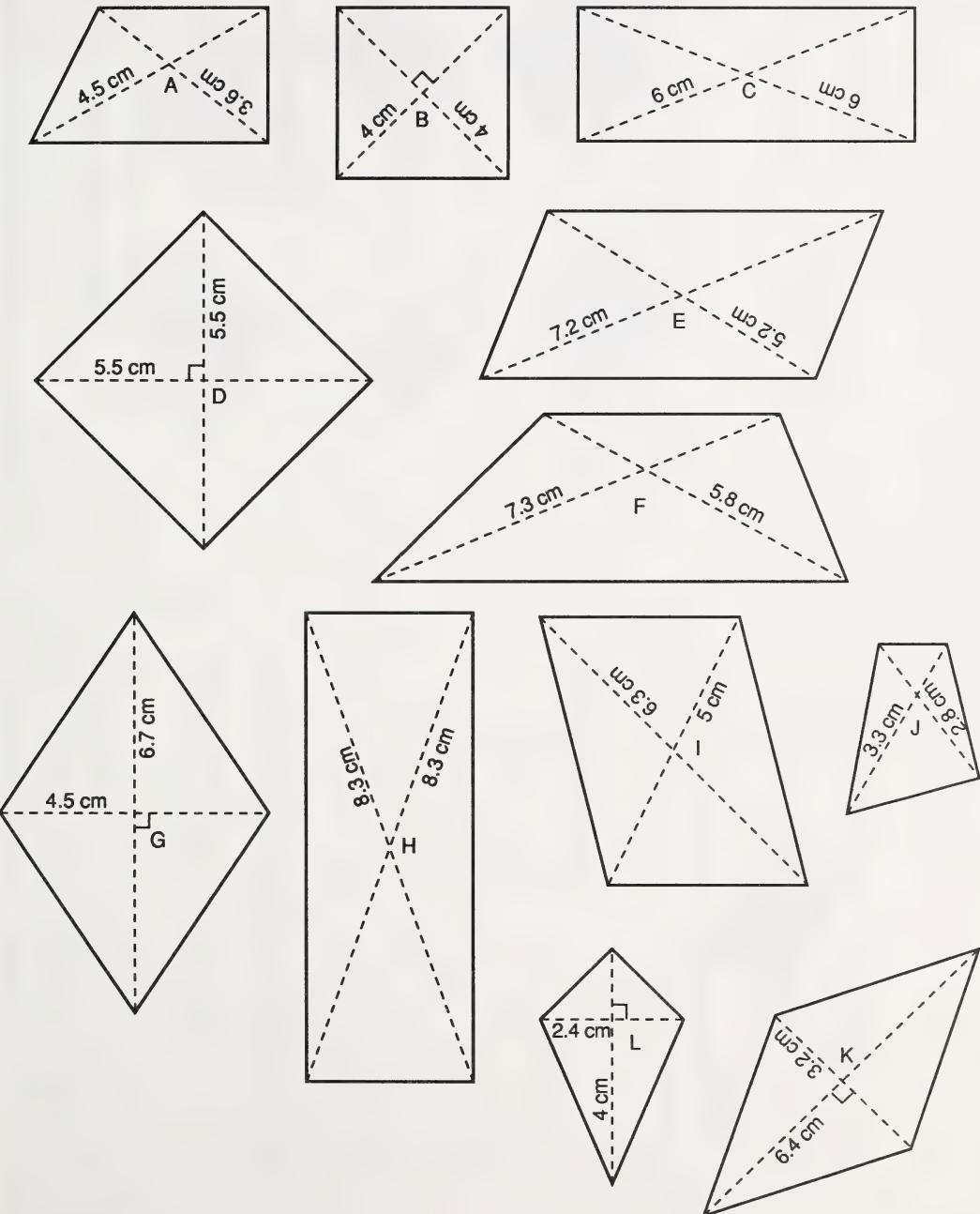
- Students can draw quadrilaterals using the commands FD and RT.  
Example:  
FD 20  
RT 70  
FD 50  
RT 130  
FD 20  
RT 70  
FD 50  
RT 130



- For each figure, do the following.
  - Draw all the diagonals.
  - Measure the lengths of the diagonals and write the measures inside the figure.
  - Measure the angles at which the diagonals cross and indicate the right angles with the symbol  $\perp$ .
  - See the answers on the next page.

3. a. Which figures have congruent diagonals?  
b. What kind of quadrilaterals are these?

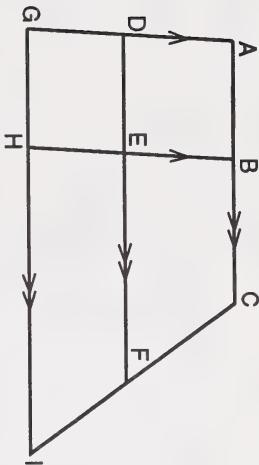
4. a. Which figures have diagonals that meet at right angles?  
b. What kind of quadrilaterals are these?



5. a. Which figures have congruent diagonals that meet at right angles?

b. What kind of quadrilaterals are these?

6. Name three parallelograms and four trapezoids in this diagram.



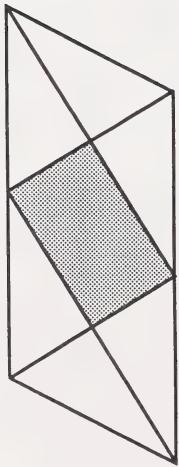
5. a. Figures B and D

b. squares

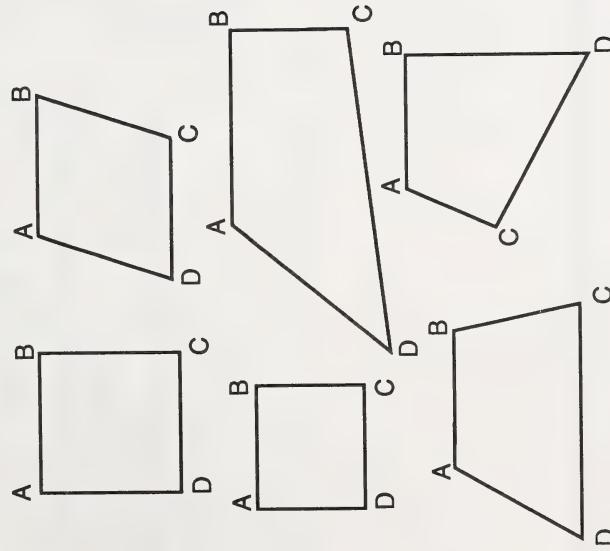
6. parallelograms: ABED, DEHG, ABHG  
trapezoids: ACIG, BCFE, EFIG, ACFD, and DFIG

7. Use a protractor to bisect each angle of this parallelogram. Extend the lines that bisect each angle until they intersect one another. What figure is created by the intersection of these lines? Hint: Bisect means to divide into two equal parts.

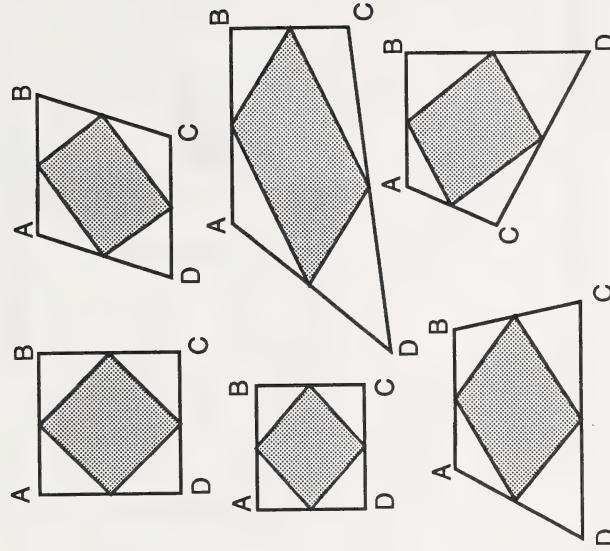
7. A rectangle is created.



8. Find the midpoints of each side of these figures. Join the midpoints together to form another four-sided figure. What do you notice about the opposite sides of these new four-sided figures?



8.



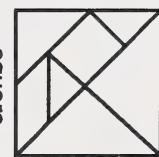
The opposite sides of these new four-sided figures are parallel and congruent.

9. Use all seven tangram pieces from the Appendix to form a rectangle, a square, and a parallelogram.

9.



rectangle



square



parallelogram

## RIGHT RECTANGULAR PRISMS

### What Lies Ahead

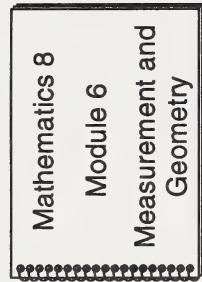
In this section the student will learn these skills.

- classifying right prisms

The student will also investigate the properties of a right rectangular prism.

### Gathering Materials

For this section the student needs these items.



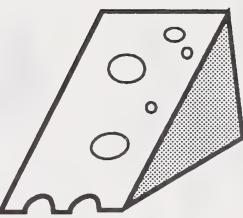
blocks

### Guiding the Student

- Emphasize to the students the goal of this section.
- Help the students decide what to do in this section.
- Help the students check their answers to the activities in this section and correct any errors.

**Introductory Activities**

1. Examine a wedge of cheese.



- a. How many flat surfaces (faces) does the wedge have?
- b. What shape is each flat surface?
- c. Which faces are congruent?

2. Examine an unsharpened pencil.



1. a. This wedge of cheese has five faces.
- b. The top and bottom faces are triangles. The side faces are rectangles.
- c. The top and bottom faces are congruent. Two of the rectangular faces are also congruent.

2. a. The unsharpened pencil has eight faces.
- b. The two end faces are hexagons. The other faces are rectangles.
- c. The two end faces are congruent hexagons. The other faces are congruent rectangles.

**Suggested Answers**

3. Examine a box of disposable cloths.



a. How many flat surfaces does the box have?

b. What shape is each flat surface?

c. Which faces are congruent?

3. a. The box has eight faces.  
b. The top and bottom faces are hexagons. The side faces are rectangles.  
c. The top and bottom faces are congruent. The side faces are congruent.

4. Examine a cereal box, toothpaste box, or tissue box.

a. How many flat surfaces (faces) does the box have?

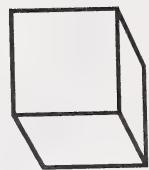
b. What shape is each flat surface (face) of the box?

c. Which faces are congruent?

4. a. The box has six faces.  
b. Each face is a rectangle.  
c. The opposite faces are congruent.



5. Examine a sugar cube or child's building block.



a. How many flat surfaces (faces) does it have?  
b. What shape is each surface (face)?  
c. Which faces are congruent?

5. a. The block has six faces.  
b. Each face is a square.  
c. All faces are congruent.

**Practice Activities****Suggested Answers**

1. Examine a cereal box, toothpaste box, or tissue box.

a. How many edges does a right rectangular prism have?

1. a. There are twelve edges.
- b. Yes, the adjacent edges are perpendicular.
- c. Yes, the opposite pair of edges of a face are parallel.
- d. There are eight vertices.
- e. Yes.

2. Use blocks to build right rectangular prisms with the following dimensions. Then draw sketches of the right rectangular prisms on the dot paper provided in the Appendix.

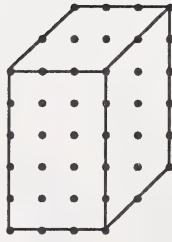
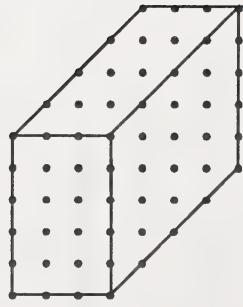
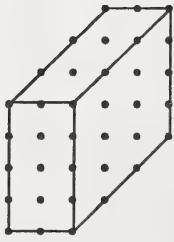
a. four blocks long, three blocks wide, two blocks high

b. five blocks long, four blocks wide, three blocks high

c. five blocks longs, two blocks wide, three blocks high

d. three blocks long, three blocks wide, three blocks high

3. Which of the right rectangular prisms in Question 2 is a cube?



3. 2. d. is a cube.

## Concluding Activities

Here are four views of the same cube. Which designs are opposite each other on the cube?



## Suggested Answers

The square is opposite the diamond.

The circle is opposite the star.

The heart is opposite the cross.

### Note

Students may wish to mark on a sugar cube or a box to help them solve this problem.



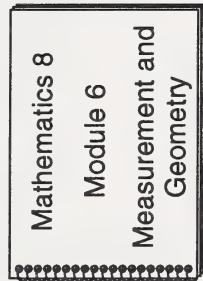
## SUMMARY

### What Lies Ahead

In this section the student will review the skills learned in Part One.

### Gathering Materials

For this section the student needs these items.



### Guiding the Student

- Emphasize to the students the goal of this section is to review Part One.

- Help the students check their answers to the pretest in Section 2 and correct any errors.



## KEEPING SKILLFUL

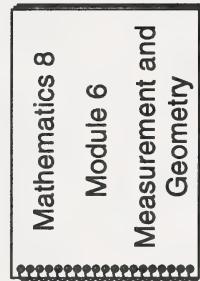
### What Lies Ahead

In this section the student will learn these skills.

- estimating and measuring length, mass, capacity, perimeter, area, and volume
- comparing the areas of figures with the same perimeter
- comparing the perimeters of figures with the same area
- relating volume and capacity in the metric system
- changing from one unit to another

### Gathering Materials

For this section the student needs these items.



ruler



### Guiding the Student

- Emphasize to the students the goal of this section is to review previously developed skills.

- Help the students check their answers to the review and correct any errors. If the students experienced difficulties you may wish to have them do some of Mathematics 7, Module 6.

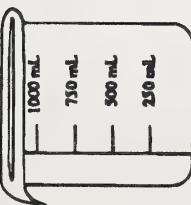
**Review**

1. Define measurement.
2. Why do you think the metric system is used by most of the countries in the world?
3. Can you ever measure absolutely accurately? Why or why not?
4. What do the following instruments measure?
  - a.  

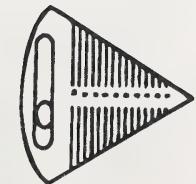
  - b.  


**Suggested Answers**

1. Measurement is the process of finding out how many measuring units are in something.
2. The metric system is based on multiples of 10, so it is simple, coherent, and logical.
3. Every measurement has a degree of uncertainty. The accuracy is influenced by the measuring instruments used and the individuals using them.
4. a. length



c. capacity or volume



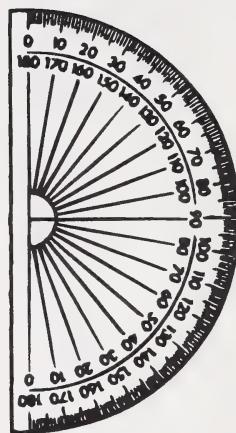
d. breadth of a gap (length across)



e.

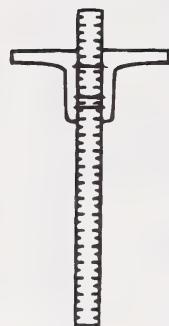
f.

f. angles



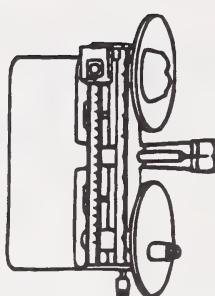
g.

g. depth



h.

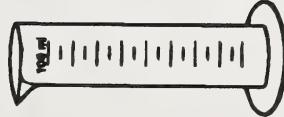
h. mass



i.

i. length

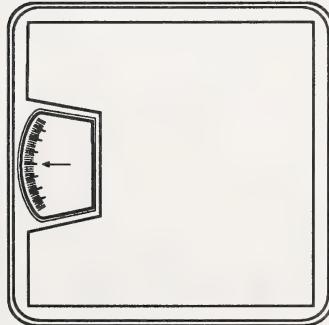




j. capacity or volume



k. length



l. mass

5. What unit would be appropriate to measure each of these quantities?

- the distance from Calgary to Banff
- the depth of the sea
- the length of a fire hose
- the width of a book
- the thickness of a sheet of paper
- your height

5. a. kilometres  
b. metres or kilometres  
c. metres  
d. centimetres  
e. millimetres or micrometres  
f. metres or centimetres

6. Is each statement reasonable? Answer yes or no.

- The pencil is 7 cm long.
- The mosquito is 7 m long.
- The flagpole is 7 mm long.
- The bike trail is 7 km long.

6. a. yes  
b. no  
c. no  
d. yes

7. Measure the following line segments.

a. \_\_\_\_\_

b. \_\_\_\_\_

c. \_\_\_\_\_

8. What unit would you use to measure each of these masses?

a. a stove

b. a toaster

c. a box of paper clips

d. yourself

e. a hair

7. a. 2 cm

b. 5 cm

c. 9 cm

8. a. kilograms

b. grams or kilograms

c. grams

d. kilograms

e. milligrams or micrograms

9. Is each statement reasonable? Answer yes or no.

a. A motorcycle has a mass of 0.3 t.

9. a. yes

b. A tennis ball has a mass of 3 kg.

b. no

c. A concrete block has a mass of 11 kg.

c. yes

d. A bicycle has a mass of 11 g.

d. no

e. A basketball has a mass of 566 g.

e. yes

f. A bag of potato chips has a mass of 450 g.

f. yes

10. What unit would you use to measure the capacity of each of these items?

a. a tube of toothpaste

10. a. millilitres

b. a carton of milk

b. litres

c. a tanker truck

c. kilolitres

d. a bottle of pop

d. litres or millilitres

e. a honey jar

e. millilitres

f. an eye dropper

f. millilitres

11. Is each statement reasonable? Answer yes or no.

- a. A hot-water tank has a capacity of 180 mL.
- b. A cereal bowl has a capacity of 225 mL.
- c. A drinking straw has a capacity of 5 mL.
- d. A water balloon has a capacity of 250 mL.
- e. A garbage can has a capacity of 15 L.
- f. A bottle cap has a capacity of 1 L.

12. Which unit would you use to measure the area of each of the following items?

- a. a garden
- b. a place mat
- c. a farm
- d. a province
- e. a stamp

- 11. a. no
- b. yes
- c. yes
- d. yes
- e. yes
- f. no

- 12. a. square metres
- b. square centimetres
- c. square hectometres or hectares
- d. square kilometres
- e. square centimetres or square millimetres

13. Is each statement reasonable? Answer yes or no.

- a. The area of a hockey rink is  $1586 \text{ km}^2$ .
- b. The area of a credit card is  $46.75 \text{ cm}^2$ .
- c. The area of a felt pennant is  $0.3 \text{ m}^2$ .
- d. The area of a stop sign is  $4320 \text{ cm}^2$ .
- e. The area of a ballpark is  $5.1 \text{ ha}$ .

14. What unit would you use to measure the volume of each of the following items?

- a. a hamster cage
- b. a moving truck
- c. a box of cereal
- d. a swimming pool

15. Is each statement reasonable? Answer yes or no.

- a. The volume of a walnut is  $12 \text{ m}^3$ .
- b. The volume of a washroom is  $0.1 \text{ m}^3$ .
- c. The volume of a softball is  $480 \text{ cm}^3$ .
- d. The volume of a loaf of bread is  $3500 \text{ m}^3$ .

13. a. no  
b. yes  
c. yes  
d. yes  
e. yes

14. a. cubic centimetres  
b. cubic metres  
c. cubic centimetres  
d. cubic metres

15. a. no  
b. no  
c. yes  
d. no

16. Complete the following unit conversions.

a.  $30 \text{ cm} = \boxed{\phantom{00}} \text{ mm}$

b.  $152 \text{ mm} = \boxed{\phantom{00}} \text{ m}$

c.  $3 \text{ L} = \boxed{\phantom{00}} \text{ mL}$

d.  $518 \text{ g} = \boxed{\phantom{00}} \text{ kg}$

17. Complete the following conversions.

a.  $13 \text{ mL} = \boxed{\phantom{00}} \text{ cm}^3$

b.  $2 \text{ L} = \boxed{\phantom{00}} \text{ cm}^3$



## GETTING SET

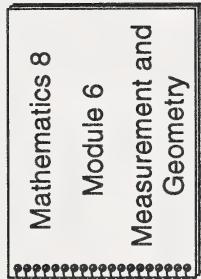
### What Lies Ahead

In this section the student will learn these skills.

- calculating the perimeter of rectangles, parallelograms, and regular polygons using formulas
- calculating the circumference of circles using a formula
- calculating the area of rectangles and squares, parallelograms, triangles, trapezoids, and circles using formulas
- calculating the volume of right rectangular prisms and cubes using formulas

### Gathering Materials

For this section the student needs these items.



### Guiding the Student

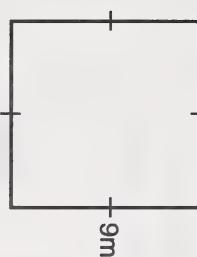
- Emphasize to the students the goal of this section is to discover their strengths and weaknesses.

- Help the students check their answers to the pretest in this section. It is not necessary to correct any errors at this time. See the last page of this section for further directions.

**Pretest****Suggested Answers**

1. Write a formula and then find the perimeter of each polygon.

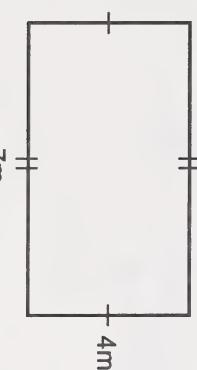
a.



$$\begin{aligned} P &= 4s \\ &= 4 \times 9 \\ &= 36 \end{aligned}$$

The perimeter is 36 m.

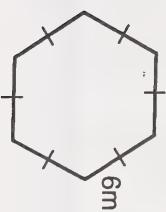
b.



$$\begin{aligned} P &= 2l + 2w \\ &= 2 \times 7 + 2 \times 4 \\ &= 14 + 8 \\ &= 22 \end{aligned}$$

The perimeter is 22 m.

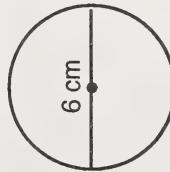
c.



$$\begin{aligned} P &= 6s \\ &= 6 \times 6 \\ &= 36 \end{aligned}$$

The perimeter is 36 m.

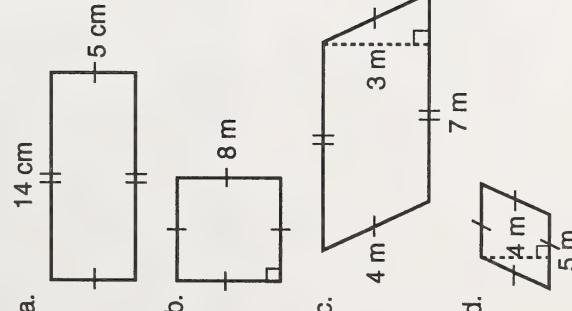
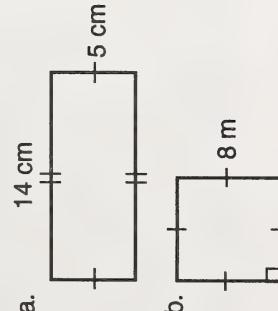
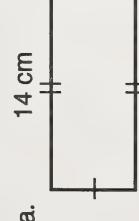
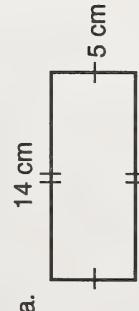
2. Write a formula and find the circumference of the circle.



$$\begin{aligned} 2. \quad C &= 2\pi d & \text{or} & \quad C = 2\pi r \\ &\doteq 3.14 \times 6 & & \doteq 2 \times 3.14 \times 3 \\ &\doteq 18.8 & & \doteq 18.8 \end{aligned}$$

The perimeter is 18.8 cm.

3. Write a formula and find the area of the following quadrilaterals.



$$\begin{aligned} 3. \quad \text{a. } A &= l \times w \\ &= 14 \times 5 \end{aligned}$$

$$= 70$$

The area is  $70 \text{ cm}^2$ .

$$\text{b. } A = l \times w$$

$$= 8 \times 8$$

$$= 64$$

The area is  $64 \text{ m}^2$ .

$$\text{c. } A = l \times w$$

$$= 7 \times 3$$

$$= 21$$

The area is  $21 \text{ m}^2$ .

$$\text{d. } A = l \times w$$

$$= 5 \times 4$$

$$= 20$$

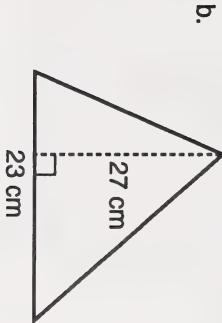
The area is  $20 \text{ m}^2$ .

5. Write a formula and find the area of the following triangles.



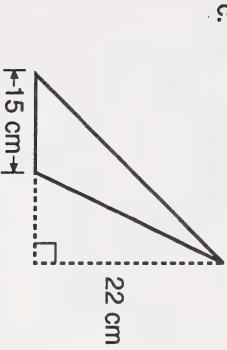
$$\begin{aligned} 5. \quad \text{a.} \quad A &= \frac{1}{2}bh \\ &= \frac{1}{2} \times 16 \times 10 \\ &= 80 \end{aligned}$$

The area is  $80 \text{ cm}^2$ .



$$\begin{aligned} \text{b.} \quad A &= \frac{1}{2}bh \\ &= \frac{1}{2} \times 23 \times 27 \\ &= 310.5 \end{aligned}$$

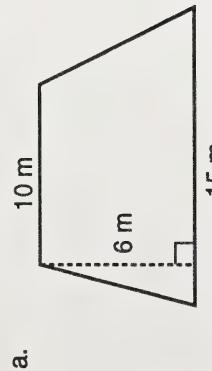
The area is  $310.5 \text{ cm}^2$ .



$$\begin{aligned} \text{c.} \quad A &= \frac{1}{2}bh \\ &= \frac{1}{2} \times 15 \times 22 \\ &= 165 \end{aligned}$$

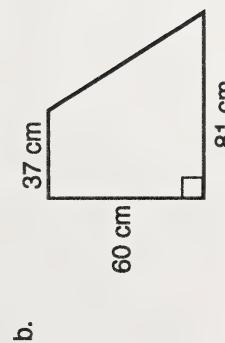
The area is  $165 \text{ cm}^2$ .

6. Write a formula and find the area of the following trapezoids.



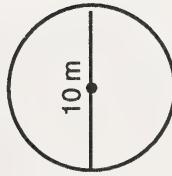
$$\begin{aligned} 6. \quad \text{a. } A &= \frac{h(b_1 + b_2)}{2} \\ &= \frac{6 \times (15 + 10)}{2} \\ &= \frac{6 \times 25}{2} \\ &= 75 \end{aligned}$$

The area is  $75 \text{ m}^2$ .



$$\begin{aligned} &\quad \text{b. } A = \frac{h(b_1 + b_2)}{2} \\ &= \frac{60 \times (81 + 37)}{2} \\ &= \frac{60 \times 118}{2} \\ &= 3540 \end{aligned}$$

7. Write a formula and find the area of the circle.

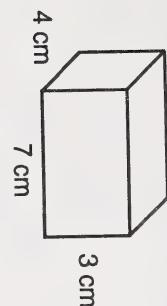


$$\begin{aligned} 7. \quad A &= \pi r^2 \\ &\doteq 3.14 \times 5^2 \\ &\doteq 3.14 \times 25 \\ &= 78.5 \end{aligned}$$

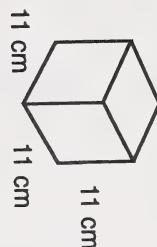
The area is  $78.5 \text{ m}^2$ .

8. Write a formula and find the volume of the following right rectangular prisms.

a.



b.



8. a. 
$$\begin{aligned}V &= l \times w \times h \\&= 7 \times 4 \times 3 \\&= 84\end{aligned}$$

The volume is  $84 \text{ cm}^3$ .

b. 
$$\begin{aligned}V &= l \times w \times h \\&= 11 \times 11 \times 11 \\&= 1331\end{aligned}$$

The volume is  $1331 \text{ cm}^3$ .

## Guiding the Student

Help the students decide what to do next. It is recommended that students review the notes in the sections which correspond to the questions in the pretest with which the students experienced success, and that the students do a few sample questions from the activities.

It is recommended that students study the notes in the sections which correspond to the questions in the pretest with which the students experienced difficulty, and that students do most of the questions in the activities.

Question	Skill	Section
1.	using formulas to find perimeter indirectly	13
2.	using a formula to find circumference indirectly	14
3. a, b.	using formulas to find the area of rectangles and squares indirectly	15
3. c., d.	using a formula to find the area of parallelograms indirectly	16
5.	using a formula to find the area of triangles indirectly	17
6.	using a formula to find the area of trapezoids indirectly	18
7.	using a formula to find the area of circles indirectly	19
8.	using a formula to find the volume of right rectangular prisms indirectly	20



# PERIMETER

## What Lies Ahead

In this section the student will learn this skill.

- using formulas as indirect measures of the perimeter of polygons

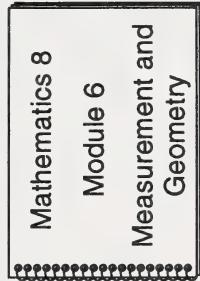
Mathematics 8  
Module 6  
Measurement and Geometry

## Gathering Materials

For this section the student needs these items.



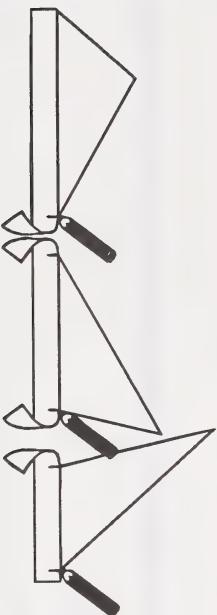
metric ruler or  
metre stick,  
string, scissors



## Guiding the Student

- Emphasize to the students the goal of this section.
- Help the students decide what to do in this section.
- Help the students check their answers to the activities in this section and correct any errors.

## Introductory Activities



a. Find the perimeter of the figures by “rolling” the figure along a metric ruler or metre stick.

b. Use a strip of paper to help you find the perimeter of each figure. Then measure the strips of paper and find the sum.

## Suggested Answers

1. Cut out the figures labelled *Section 13 Polygons* in the Appendix. Then use one or more of the following methods to find the perimeter of each figure. Record the perimeter of each figure on the figure.

a. Find the perimeter of the figures by “rolling” the figure along a metric ruler or metre stick.

1. The perimeter of figure A is 24.6 cm.  
The perimeter of figure B is 23.2 cm.

The perimeter of figure D is 26.8 cm.

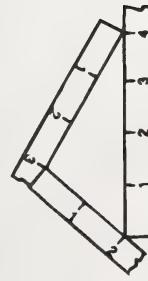
The perimeter of figure F is 24.2 cm.

Students answers will vary, depending on how carefully they measure each perimeter.

c. Use string to help you find the perimeter of each figure.  
Then measure the string.

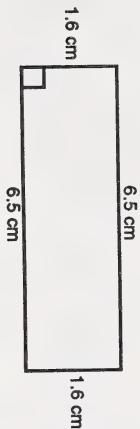


d. Measure each side of a figure and find the sum.

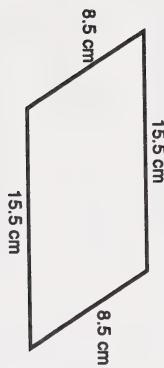


2. Find the perimeter of each of the following figures.

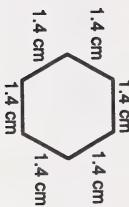
a.



b.



c.



2. a.  $6.5 + 6.5 + 1.6 + 1.6 = 16.2$

The perimeter is 16.2 cm.

b. The perimeter is 48 cm.

c. The perimeter is 8.4 cm.

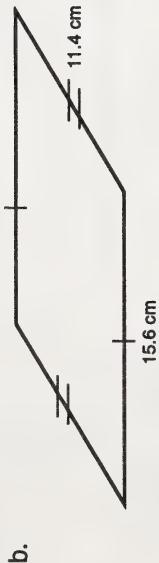
**Practice Activities**

1. Write a formula and then find the perimeter of each polygon.



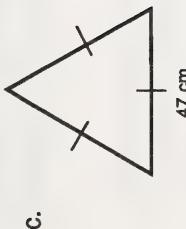
$$\begin{aligned} \text{a. } P &= l + 2w \\ &= 2 \times 9 + 2 \times 5.1 \\ &= 18 + 10.2 \\ &= 28.2 \end{aligned}$$

The perimeter is 28.2 m.



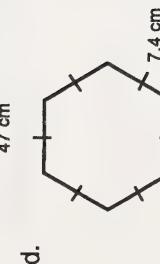
$$\begin{aligned} \text{b. } P &= l + 2w \\ &= 2 \times 15.6 + 2 \times 11.4 \\ &= 31.2 + 22.8 \\ &= 54 \end{aligned}$$

The perimeter is 54 cm.



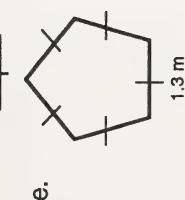
$$\begin{aligned} \text{c. } P &= 3s \\ &= 3 \times 47 \\ &= 141 \end{aligned}$$

The perimeter is 141 cm.



$$\begin{aligned} \text{d. } P &= 6s \\ &= 6 \times 7.4 \\ &= 44.4 \end{aligned}$$

The perimeter is 44.4 cm.



$$\begin{aligned} \text{e. } P &= 5s \\ &= 5 \times 1.3 \\ &= 6.5 \end{aligned}$$

The perimeter is 6.5 m.

2. Write a formula for the perimeter and find the perimeter of each of these polygons.

- a square with sides that are 9.2 m long
- a regular pentagon with sides that are 73 mm long
- a regular nonagon with sides that are 18 cm long

3. Use formulas to find the perimeters of the following polygons.

- a rectangle with dimensions of 0.4 m by 1600 mm
- a parallelogram with dimensions of 14 cm by 150 mm
- a rectangle with a length of 8.1 cm and a width of 45 mm
- a rectangle with a base of 14 mm and a height of 23 mm
- a rectangle with dimensions of 71 mm and 18 mm

2. a.  $P = 4s$   
 $= 4 \times 9.2$   
 $= 36.8$   
The perimeter is 36.8 m.

b.  $P = 5s$   
 $= 5 \times 73$   
 $= 365$   
The perimeter is 365 mm.

c.  $P = 9s$   
 $= 9 \times 18$   
 $= 162$   
The perimeter is 162 cm.

3. a.  $P = 2l + 2w$   
 $= 2 \times 0.4 + 2 \times 1.6$   
 $= 0.8 + 3.2$   
 $= 4$   
The perimeter is 4 m.

b.  $P = 2l + 2w$   
 $= 2 \times 14 + 2 \times 15$   
 $= 28 + 30$   
 $= 58$   
The perimeter is 58 cm.

c.  $P = 2l + 2w$   
 $= 2 \times 8.1 + 2 \times 4.5$   
 $= 16.2 + 9$   
 $= 25.2$   
The perimeter is 25.2 cm.

d. The perimeter is 74 mm.

e. The perimeter is 178 mm.

4. The Pentagon in Washington, D.C. is so named because of its shape. Each of its outer walls is 302 m long. Find the minimum distance (in kilometres) that you would travel while walking around the outside of the Pentagon.

4. a.  $P = 5s$   
 $= 5 \times 0.302$   
 $= 1.51$

The perimeter is 1.51 km.

$$\left. \begin{array}{l} 302 \\ 302 \\ 302 \\ 302 \\ 302 \end{array} \right\} m = 0.302 \text{ km}$$

**Suggested Answers****Extra Practice**

Complete the puzzle on the following page.<sup>1</sup>

First, figure out the perimeter of any polygon. Then find your answer in the coded line at the bottom of the page.

Second, each time the answer appears in the code, write the letter of that problem above it.

Keep working until you have decoded the line.

---

<sup>1</sup>Creative Publications for excerpt from *Mathimagination* ©1973, Sunnyvale, California 94086

# CODE LINE

**U** Triangle with sides of 13 cm, 17 cm, and 24 cm

**M** Square with side of 20 cm

**T** Rectangle with sides of 29 cm and 36 cm

**G** Equilateral triangle with side of 43 cm

**O** Parallelogram with sides of 8 cm and 18 cm

**E** Regular octagon with side of 14 cm

**I** Quadrilateral with sides of 23 cm, 29 cm, 31 cm, and 44 cm

**D** Regular pentagon with side of 15 cm

**S** Isosceles triangle with base of 12 cm and side of 19 cm

**H** Rhombus with side of 55 cm

**P** Rectangle with sides of 7 cm and 16 cm

**A** Regular hexagon with side of 6 cm

**N** Pentagon with sides of 13 cm, 14 cm, 17 cm, 22 cm, and 27 cm

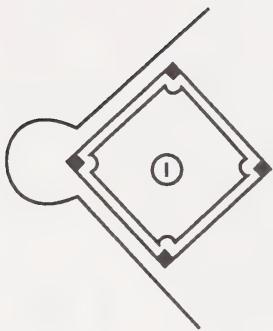
**R** Parallelogram with sides of 48 cm and 66 cm

## Title: Wet Threat

R	A	I	N	•	S	U	R	E	•	P	U	T	S	•	A
228 cm	36 cm	127 cm	93 cm	50 cm	54 cm	228 cm	112 cm	46 cm	54 cm	130 cm	50 cm	36 cm			
D	A	M	P	E	R	•	O	N	•	T	H	l	N	G	S
75 cm	36 cm	80 cm	46 cm	112 cm	228 cm	52 cm	93 cm	130 cm	220 cm	127 cm	93 cm	129 cm	50 cm		

## Concluding Activities

1. A window measures 124 cm by 92 cm.
  - a. Find the length of the weather stripping needed to go around the window.
  - b. The weather stripping is sold by the metre only. It costs 38¢/m. Find the cost of the weather stripping.
2. Each side of a stop sign is 28.2 cm long. Find the perimeter in metres.
3. The distance between each base on a ball diamond is 27.4 m. Find the approximate distance that a player travels to score a run.



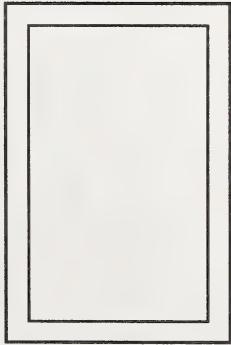
## Suggested Answers

1. a. 432 cm of weather stripping is needed.  
b. The cost is \$1.64.
2. The perimeter is 225.6 cm or 2.256 m.
3. The distance a runner travels is 109.6 m.

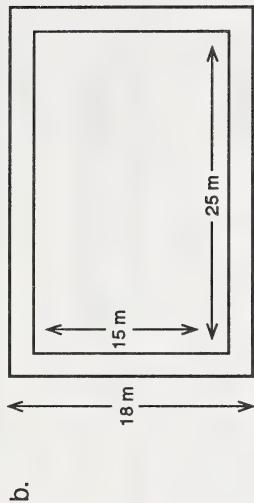
4. A rectangular pool is 25 m long and 15 m wide. It is surrounded by a cement deck that is 1.5 m wide.

a. Find the perimeter of the pool.

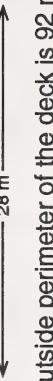
b. Find the outside perimeter of the deck.



4. a. The perimeter of the pool is 80 m.



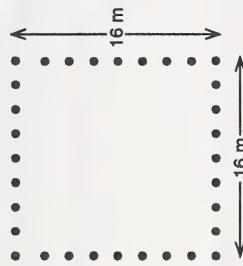
b.



The outside perimeter of the deck is 92 m.

5. If fence posts are placed 2 m apart, how many are needed to fence a yard that is square with sides 16 m long?

5.



6. Obtain a one dollar coin. The shape is classified as a hendecagon. It has eleven sides. First estimate its perimeter. Then measure its actual perimeter.

6.

Estimates will vary.

$$\begin{aligned} P &= 11 \times s \\ &\doteq 11 \times 0.7 \\ &\doteq 7.7 \end{aligned}$$

The side of a loonie  
is about 0.7 cm.  
7.7

The perimeter is about 7.7 cm.

#### Note

The accuracy of the perimeter depends on how the side is measured.

7. Mr. Wilson is building the frames for seven windows for a new house that he is building. The dimensions of the windows are as follows:

Number of Windows	Dimensions
2	1.5 m by 2 m
3	1.2 m by 1.5 m
1	2.5 m by 2 m
1	1.8 m by 2 m

a. How many metres of lumber does he need? (You may disregard the width of the lumber.)

b. If the lumber comes in 3 m lengths, what is the minimum number of pieces that Mr. Wilson needs?

7. a. The amount of lumber required is 46.8 m.

b. The minimum number of pieces needed is 16.

# CIRCUMFERENCE

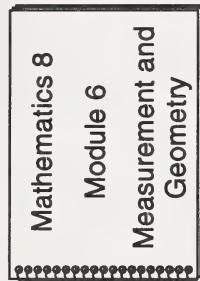
## What Lies Ahead

In this section the student will learn these skills.

- knowing what  $\pi$  is and determining its value
- writing and using a formula that will indirectly measure the circumference of a circle

## Gathering Materials

For this section the student needs these items.



ruler

## Guiding the Student

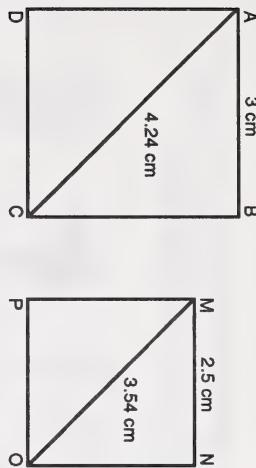
- Emphasize to the students the goal of this section.

- Help the students decide what to do in this section.

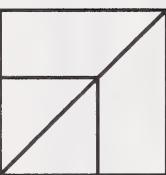
- Help the students check their answers to the activities in this section and correct any errors.

**Introductory Activities****Suggested Answers**

1. All squares are similar figures. They all have the same shape.



If you stack the figures, their diagonals will line up.

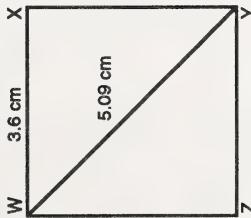


- Calculate the ratio of the measures of  $\overline{AB}$  to  $\overline{MN}$ .
- Calculate the ratio of the measures of  $\overline{AC}$  to  $\overline{MO}$ . Round to nearest tenth.
- Calculate the ratio of the perimeter of square ABCD to square MNO.
- What do you notice about the ratios of the corresponding parts?

- $\frac{3}{2.5} = 1.2$
  - $\frac{4.24}{3.54} = 1.2$
  - $\frac{12}{10} = 1.2$
  - They are all the same.

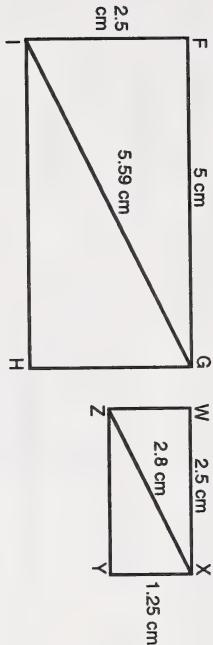
2. Use the squares in Question 1 to do the following questions.

- Calculate the ratio of the perimeter of square ABCD to the measure of its diagonal. Round to the nearest tenth.
- Calculate the ratio of the perimeter of square MNOP to the measure of its diagonal. Round to the nearest tenth.
- What do you notice about the ratio of the perimeter to the measure of the diagonal of these squares?
- What do you think will be the ratio of the perimeter to the diagonal of this square?



- a.  $\frac{12}{4.24} = 2.8$
- b.  $\frac{10}{3.54} = 2.8$
- c. The ratios are both 2.8.
- d. 2.8

3. Not all rectangles are similar. However, the following rectangles are similar figures.



If you stack the figures, their diagonals will line up.

a. Calculate the ratio of the perimeter of rectangle  $\text{FGHI}$  to the measure of its diagonal. Round to the nearest tenth.

b. Calculate the ratio of the perimeter of rectangle  $\text{WXYZ}$  to the measure of its diagonal. Round to the nearest tenth.

c. What do you notice about the ratios of these figures?

d. What do you think the ratio of perimeter to diagonal will be for other rectangles of this shape?

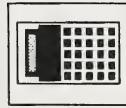
3. a.  $\frac{15}{5.59} = 2.7$

b.  $\frac{7.5}{2.8} = 2.7$

c. The are both 2.7.

d. 2.7

4. Measure the circumference and the diameter of four circular objects to the nearest tenth of a centimetre. Be as accurate as possible. Then calculate the ratio of the circumference to the diameter. Express the ratio as a decimal number. Display your data in the chart.



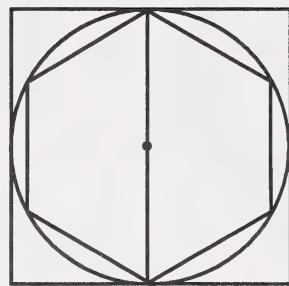
4. Answers will vary for the circumference and diameter of each object. However, the ratio of circumference to diameter will be about 3 for each object.

The ratio of the circumference of a circle to its diameter is about 3.

Object	Circumference (cm)	Diameter (cm)	Ratio of Circumference to Diameter

The ratio of the circumference of a circle to its diameter is about \_\_\_\_\_.

5. In the following diagram the diameter of the circle is 2 cm, the sides of the square are 2 cm, the sides of the hexagon are 1 cm.



- a. Calculate the perimeter of the square.
- b. Calculate the perimeter of the hexagon.
- c. Estimate the perimeter of the circle.

5. a.  $P = 4s$

$$= 4 \times 2$$

$$= 8$$

The perimeter of the square is 8 cm.

b.  $P = 6s$

$$= 6 \times 1$$

$$= 6$$

The perimeter of the hexagon is 6 cm.

- c. The perimeter of the circle should be between 6 and 8 cm.

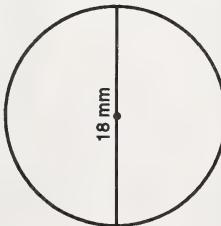
**Practice Activities****Suggested Answers**

1. Estimate the circumference of each circle with the following measurements.

- a. diameter is 5 cm
- b. radius is 9.5 m
- c. diameter is 20 cm
- d. radius is 15 mm

2. Calculate the circumferences of these circles. Round your answers to the nearest tenth.

a.

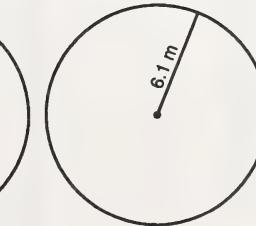


$$\left. \begin{array}{l} \text{π is about 3.14.} \\ \text{d = 18 mm} \end{array} \right\}$$

$$\begin{aligned} C &= \pi d \\ &\doteq 3.14 \times 18 \\ &\doteq 56.5 \end{aligned}$$

The circumference is about 56.5 mm.

b.



$$\left. \begin{array}{l} \text{d = 2r} \\ \text{r = 6.1 m} \end{array} \right\}$$

$$\begin{aligned} C &= \pi d \\ &\doteq 3.14 \times 12.2 \\ &\doteq 38.3 \end{aligned}$$

The circumference is about 38.3 m.

3.

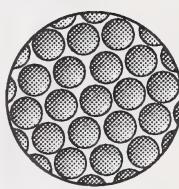
$$\begin{aligned} C &= \pi d \\ &\doteq 3.14 \times 4.2 \\ &\doteq 13.2 \end{aligned}$$

3. What is the circumference of a circular flower garden with a diameter of 4.2 m?

The circumference of the circular flower garden is about 13.2 m.

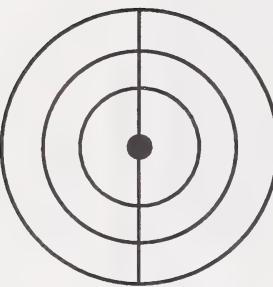
4. A golf ball has a diameter of 42.7 mm. What is its circumference?

$$\begin{aligned} C &= \pi d \\ &\doteq 3.14 \times 42.7 \\ &\doteq 134.1 \end{aligned}$$



The circumference of the ball is about 13.41 cm.

5. The diameters of the three larger rings on a sheet of curling ice are 3.66 m, 2.44 m, and 1.22 m. Calculate the circumference of each ring.



$$\begin{aligned} C &= \pi d \\ &\doteq 3.14 \times 3.66 \\ &\doteq 11.49 \end{aligned}$$

The circumference of the first ring is about 11.49 m.

$$\begin{aligned} C &= \pi d \\ &\doteq 3.14 \times 2.44 \\ &\doteq 7.66 \end{aligned}$$

The circumference of the second ring is about 7.66 m.

$$\begin{aligned} C &= \pi d \\ &\doteq 3.14 \times 1.22 \\ &\doteq 3.83 \end{aligned}$$

The circumference of the third ring is about 3.83 m.

### Extra Practice

Complete the puzzle on the following page.<sup>1</sup>

### Suggested Answers

See the following page for answers.

<sup>1</sup> Creative Publications for excerpt from *Mathimagination* ©1973, Sunnyvale, California 94086

## FIND A MATCH

Each of the two blocks below is divided into 20 boxes. Boxes in the top block contain the diameter ( $d$ ) or radius ( $r$ ) of a circle. Figure out the circumference ( $C$ ) of any of these circles, using  $\pi = 3.14$ . Then find your answer in the bottom block. Transfer the word from the top box into the bottom box.

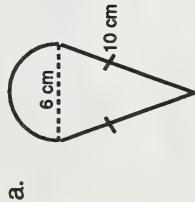
Keep working and you will spell out a funny saying.

$d = 1 \text{ m}$ STILL	$d = 1 \text{ cm}$ OR	$d = 3 \text{ m}$ TO	$d = 8 \text{ m}$ LOT	$d = 10 \text{ cm}$ A
$d = 5 \text{ cm}$ THE	$d = 12 \text{ m}$ OF	$d = 1.4 \text{ cm}$ ARE	$d = 9 \text{ cm}$ A	$d = 4.9 \text{ cm}$ NOT
$r = 1 \text{ m}$ WAS	$r = 3 \text{ m}$ FAMOUS	$r = 8 \text{ cm}$ WHETHER	$r = 10 \text{ cm}$ DECIDE	$r = 5 \text{ m}$ SCIENTISTS
$r = 50 \text{ cm}$ CRACK	$r = 1.5 \text{ cm}$ TRYING	$r = 3.3 \text{ m}$ ATOM	$r = 2.5 \text{ m}$ WISE	$r = 5.3 \text{ m}$ SPLITTING

$C = 28.26 \text{ cm}$ A	$C = 25.12 \text{ m}$ LOT	$C = 37.68 \text{ m}$ OF	$C = 18.84 \text{ m}$ FAMOUS	$C = 31.4 \text{ m}$ SCIENTISTS
$C = 4.396 \text{ cm}$ ARE	$C = 3.14 \text{ m}$ STILL	$C = 9.42 \text{ cm}$ TRYING	$C = 9.42 \text{ m}$ TO	$C = 62.8 \text{ cm}$ DECIDE
$C = 50.24 \text{ cm}$ WETHER	$C = 3.14 \text{ cm}$ OR	$C = 15.386 \text{ cm}$ NOT	$C = 33.284 \text{ m}$ SPLITTING	$C = 15.7 \text{ cm}$ THE
$C = 20.724 \text{ m}$ ATOM	$C = 6.28 \text{ m}$ WAS	$C = 31.4 \text{ cm}$ A	$C = 15.7 \text{ m}$ WISE	$C = 314 \text{ cm}$ CRACK

## Concluding Activities

1. Find the perimeter of each figure. Round to the nearest tenth.



## Suggested Answers

1. a.  $C = \pi d$   
 $\quad\quad\quad \doteq 3.14 \times 6$   
 $\quad\quad\quad \doteq 18.8$

So,  $0.5 \times 18.8 = 9.4$ .

The circumference of the arc is about 9.4 cm.

$$\begin{aligned} P &\doteq 9.4 + 10 + 10 \\ &\doteq 29.4 \end{aligned}$$

The total perimeter of the figure is 29.4 cm.

b.  $C = \pi d$   
 $\quad\quad\quad \doteq 3.14 \times 2$   
 $\quad\quad\quad \doteq 6.3$

So,  $0.5 \times 6.3 \doteq 3.2$ .

The circumference of the arc is about 3.2 cm.

$$\begin{aligned} P &\doteq 3.2 + 2 + 2 + 2 \\ &\doteq 9.2 \end{aligned}$$

The total perimeter is about 9.2 cm.

c.  $C = \pi d$   
 $\quad\quad\quad \doteq 3.14 \times 14$   
 $\quad\quad\quad \doteq 44.0$

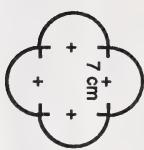
So,  $0.25 \times 44.0 \doteq 11$ .

The circumference of the arc is about 11 mm.

$$\begin{aligned} P &\doteq 11 + 7 + 7 \\ &\doteq 25 \end{aligned}$$

The total perimeter is about 25 mm.

d.



+ indicates the centre of a circle.

The circumference of the arc is half the circumference of the circle.



The total perimeter is about 44 cm.

$$\text{e. } C = \pi d$$

$$\doteq 3.14 \times 25$$

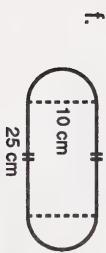
$$\doteq 77.5$$

$$0.5 \times 77.5 \doteq 38.8$$

The circumference of the arc is about 38.8 m.

$$\text{f. } P \doteq 38.8 + 20 + 20 + 25$$

The total perimeter is about 103.8 m.



$$\text{f. } C = \pi d$$

$$\doteq 3.14 \times 10$$

$$\doteq 31.4$$

The circumference of the two arcs is about 31.4 cm.

$$P \doteq 31.4 + 25 + 25$$

$$\doteq 81.4$$

The total perimeter is about 81.4 cm.

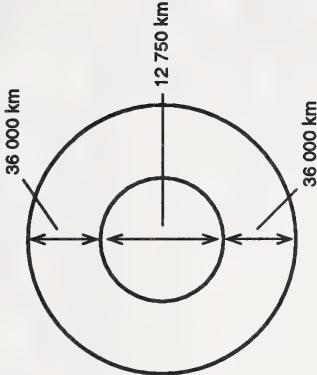
2. The diameter of the earth at the equator is approximately 12 750 km.

a. The circumference of the earth is about how many kilometres?

b. If a satellite is orbiting the earth 36 000 km above the earth's surface, how far does it travel in completing one orbit?

2. a. The circumference of the earth is about 40 035 km.  
b. The diameter of the circular orbit is 84 750 km.

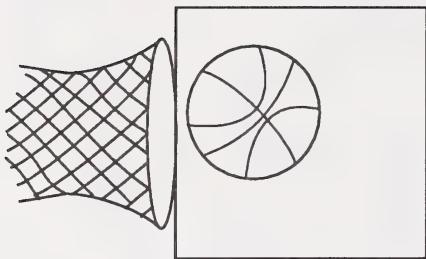
The satellite travels about 266 115 km.



3. The diameter of a basketball is 24.5 cm. The diameter of a basketball hoop is 45 cm. (You may wish to draw a diagram to help you answer the questions.)

a. The circumference of the hoop is how much larger than the circumference of the basketball?

b. If the ball goes through the center of the hoop, find the distance between the ball and the hoop.



$$\begin{aligned} 3. \quad \text{a.} \quad C &= \pi d \\ &\doteq 3.14 \times 45 \\ &= 141.3 \end{aligned}$$

The circumference of the basketball hoop is about 141.3 cm.

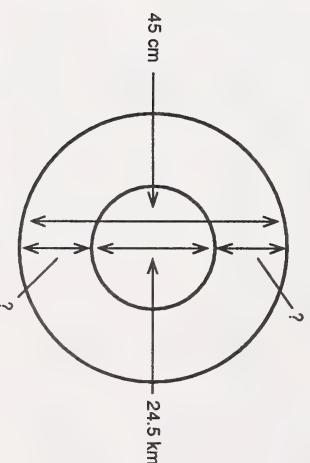
$$\begin{aligned} C &= \pi d \\ &\doteq 3.14 \times 24.5 \\ &= 76.9 \end{aligned}$$

The circumference of the basketball is about 76.9 cm.

$$141.3 - 76.9 = 64.4$$

The circumference of the hoop is about 64.4 cm larger.

b.



$$\begin{aligned} 45 - 24.5 &= 20.5, \\ \text{and } 0.5 \times 20.5 &= 10.25. \end{aligned}$$

The distance between the ball and the hoop is 10.25 cm.

## AREA OF RECTANGLES AND SQUARES

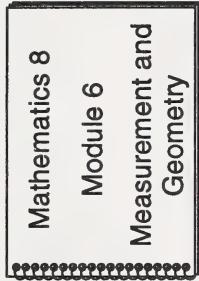
### What Lies Ahead

In this section the student will learn this skill.

- using a formula to determine the area of a rectangle

### Gathering Materials

For this section the student needs these items.



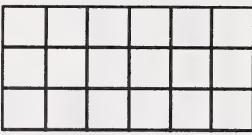
### Guiding the Student

- Emphasize to the students the goal of this section.
- Help the students decide what to do in this section.
- Help the students check their answers to the activities in this section and correct any errors.

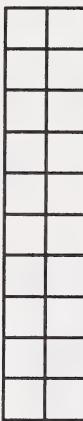
**Introductory Activities**

1. Find the area of each rectangle.

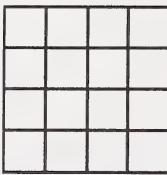
a.



b.



c.



2. a. Did you count squares to find the area?

b. Is there an easier way?

2. a. Answers will vary.

b. The easiest way to calculate the area of these rectangles is to count the number of squares in a row and the number of rows. Then multiply these two numbers together.

**Suggested Answers**

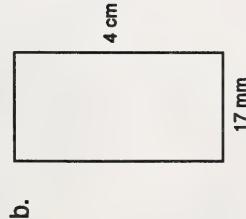
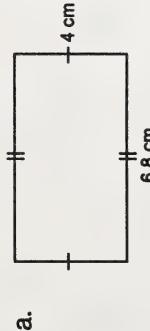
1. a. 18 square units

b. 20 square units

c. 16 square units

**Practice Activities**

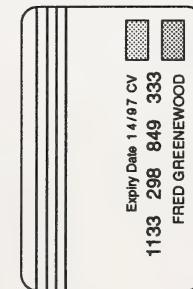
1. Use the formula to find the area of each rectangle.

**Suggested Answers**

1. a.  $A = b \times h$   
=  $6.8 \times 4$   
= 27.2  
The area is  $27.2 \text{ cm}^2$ .

b.  $A = b \times h$   
=  $1.7 \times 4$   
= 6.8  
The area is  $6.8 \text{ cm}^2$ .

2. A credit card measures 8.5 cm by 5.4 cm. Find its area.



2.  $A = b \times h$   
=  $8.5 \times 5.4$   
= 45.9  
The area is  $45.9 \text{ cm}^2$ .

**Extra Practice**

Complete the puzzle on the following page.<sup>1</sup>

Figure out the area of each rectangle. Then write the letter inside each rectangle into a box at the bottom of the page. The letter of the smallest rectangle goes in the first box, the letter of the next smallest rectangle goes in the second box, and so on up to the largest rectangle.

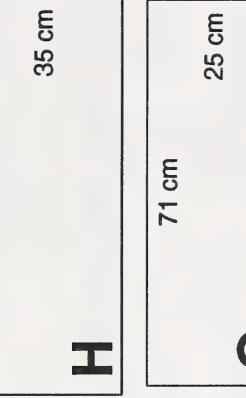
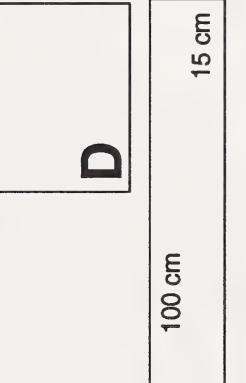
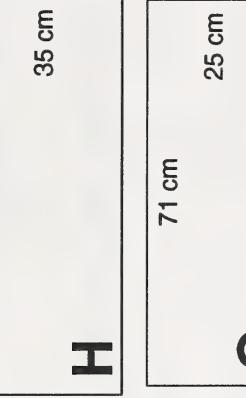
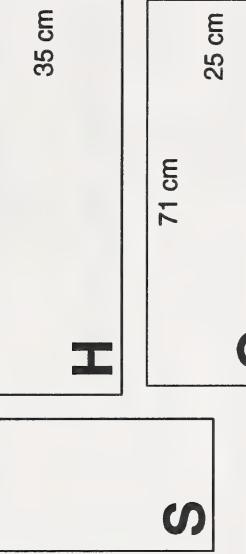
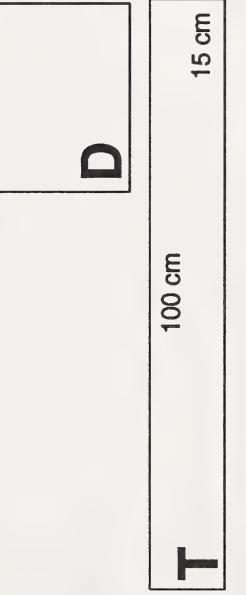
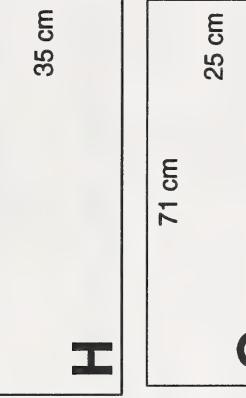
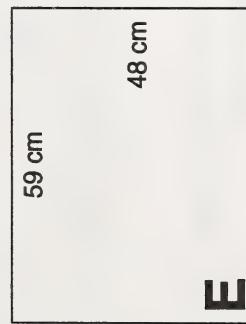
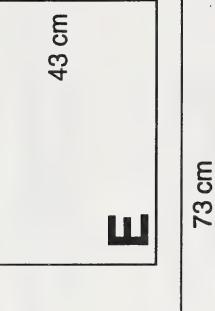
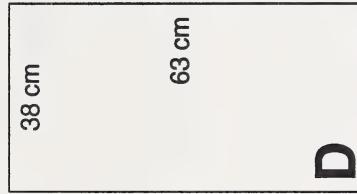
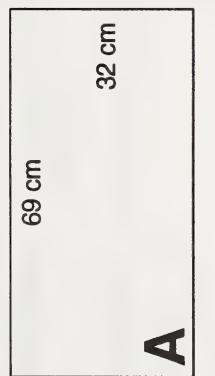
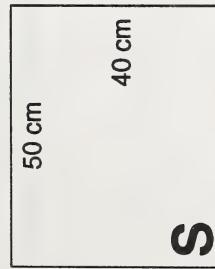
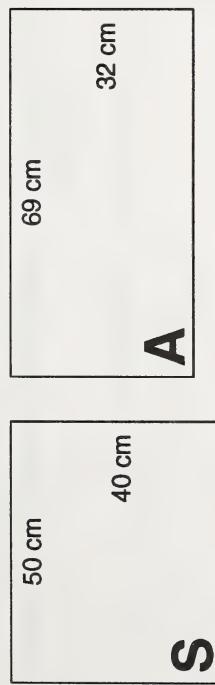
Write the letters in proper order and you will have the answer to the question.

**Suggested Answers**

See the following page for answers.

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<sup>1</sup>Creative Publications for excerpt from *Mathimagination* ©1973, Sunnyvale, California 94086

**WHY DID ORGO USE YEAST AND SHOE POLISH?**

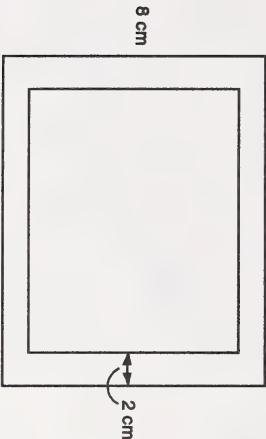
LARGEST									
T	O	R	I	S	E	A	N	D	S

SMALLEST									
N	I	L	S	A	N	D	S	H	I

## Concluding Activities

1. a. What happens to the area of a rectangle when its sides are doubled in length?
  - b. What happens to the area of a rectangle when its sides are tripled in length?

2. Find the area of this picture frame.



$$\begin{aligned} 2. \quad A &= b \times h \\ &= 10 \times 8 \\ &= 80 \end{aligned}$$

The area of the larger rectangle is  $80 \text{ cm}^2$ .

$$\begin{aligned} A &= b \times h \\ &= 6 \times 4 \\ &= 24 \end{aligned}$$

$\left. \begin{array}{l} 10 - 4 = 6 \\ 8 - 4 = 4 \end{array} \right\}$

The area of the smaller rectangle is  $24 \text{ cm}^2$ .

$$80 - 24 = 56$$

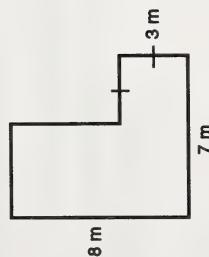
The area of the picture frame is  $56 \text{ cm}^2$ .

## Suggested Answers

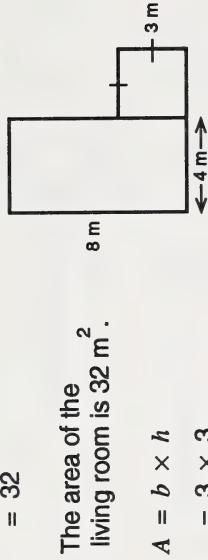
1. a. The area of the new rectangle is quadruple the area of the original.

- b. Its area is nine times the original area.

3. Mrs. Ben Zui is carpeting her living room and dining room.  
The cost of carpeting is \$34.24/m<sup>2</sup>.



3. a.  $A = b \times h$   
 $= 4 \times 8$   
 $= 32$



The area of the living room is 32 m<sup>2</sup>.  
$$\begin{aligned}A &= b \times h \\&= 3 \times 3 \\&= 9\end{aligned}$$

a. Find the amount of carpet needed.

b. Calculate the cost of carpeting the two rooms.

The area of the dining room is 9 m<sup>2</sup>.

$$32 + 9 = 41$$

The total area of the living room and the dining room is 41 m<sup>2</sup>.

So, 41 m<sup>2</sup> of carpeting is required.

b.  $41 \times 34.24 = 1403.84$

The cost of carpeting the rooms is \$1403.84.



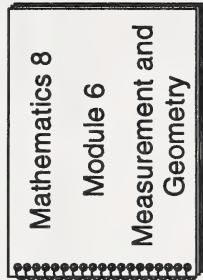
## AREA OF PARALLELOGRAMS

### What Lies Ahead

In this section the student will use a formula to determine the area of a parallelogram.

### Gathering Materials

For this section the student needs these items.

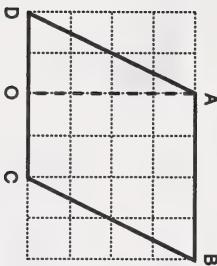


### Guiding the Student

- Emphasize to the students the goal of this section.
- Help the students decide what to do in this section.
- Help the students check their answers to the activities in this section and correct any errors.

**Introductory Activities**

1. Draw figure ABCD on a sheet of grid paper from the Appendix. Cut off the triangular portion AOD and slide it across the figure so  $\overline{AD}$  fits on  $\overline{BC}$ . Then find the area of figure ABCD.

**Suggested Answers**

1. The area of figure ABCD is 16 square units.

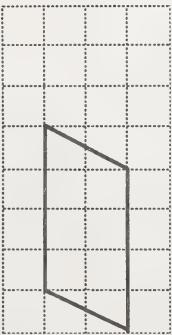
2. Use the method that you discovered in Question 1 to find the areas of the following figures.

a.



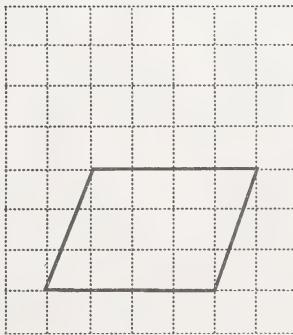
2. a. The area is 12 square units.

b.



2. b. The area is 8 square units.

c.

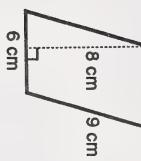


2. c. The area is 12 square units.

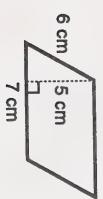
**Practice Activities****Suggested Answers**

1. What is the length of the base and the height of each parallelogram?

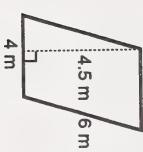
a.



b.



c.



2. Use the formula to find the area of each parallelogram in Question 1.

2. a.  $b = 6 \text{ cm}$   
b.  $h = 8 \text{ cm}$   
c.  $b = 7 \text{ cm}$   
 $h = 5 \text{ cm}$

c.  $b = 4 \text{ m}$   
 $h = 4.5 \text{ m}$

3. Complete the chart for parallelograms.

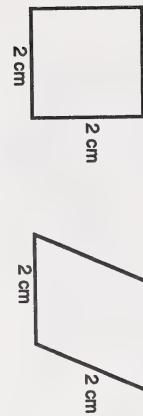
Base	Height	Smaller Units	Area in Larger Units
a. 25 cm	80 mm		
b. 800 cm	5 m		
c. 4.2 cm	32 mm		
d. 0.2 km	800 m		

3.

	Base	Height	Smaller Units	Area in Larger Units
a.	25 cm	80 mm	20 000 mm <sup>2</sup>	200 cm <sup>2</sup>
b.	800 cm	5 m	4000 cm <sup>2</sup>	40 m <sup>2</sup>
c.	4.2 cm	32 mm	1344 mm <sup>2</sup>	13.44 cm <sup>2</sup>
d.	0.2 km	800 m	160 000 mm <sup>2</sup>	0.16 km <sup>2</sup>

## Concluding Activities

- The base of a parallelogram is 10 cm. The height is 2 cm more than half the base. Find the area of the parallelogram.
- The height of a parallelogram is 4.5 cm. The base is twice the height. What is the area of the parallelogram?
- Below are a square and a rhombus.



a. What is the area of the square?

b. Is the area of the rhombus greater than, less than, or equal to the area of the square? Give a reason for your answer.

## Suggested Answers

1.  $\frac{1}{2} \times 10 + 2 = 7$   
The height is 7 cm.

$$\begin{aligned} A &= bh \\ &= 10 \times 7 \\ &= 70 \end{aligned}$$

The area is 70 cm<sup>2</sup>.

2.  $2 \times 4.5 = 9$

The base is 9 cm.

$$\begin{aligned} A &= b \times h \\ &= 9 \times 4.5 \\ &= 40.5 \end{aligned}$$

The area is 40.5 cm<sup>2</sup>.

3. a.  $A = bh$

$$\begin{aligned} &= 2 \times 2 \\ &= 4 \end{aligned}$$

The area of the square is 4 cm<sup>2</sup>.



The height is less than 2 cm.

So, the area of the rhombus will be less than the area of the square.

## AREA OF TRIANGLES

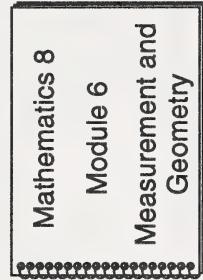
### What Lies Ahead

In this section the student will learn these skills.

- using a formula to determine the area of triangles

### Gathering Materials

For this section the student needs these items.



scissors



Lesson Series E in  
Geometric Concepts/Area  
(optional)



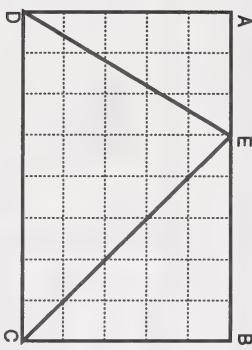
### Guiding the Student

- Emphasize to the students the goal of this section.
- Help the students decide what to do in this section.

- Help the students check their answers to the activities in this section and correct any errors.

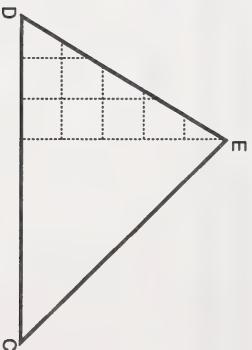
## Introductory Activities

1. Draw rectangle ABCD on a sheet of grid paper from the Appendix. Cut out the rectangle and then cut out triangle CDE as illustrated.



Now arrange the two smaller triangles, triangle AED and triangle EBC, to fit exactly inside triangle CDE. You may have to turn or flip the pieces to make them fit.

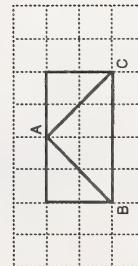
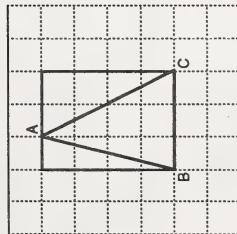
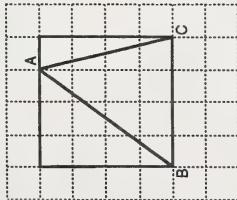
- a. How is the area of triangle CDE related to the area of rectangle ABCD?
- b. Calculate the area of the rectangle.
- c. Use the relationship you discovered in part a. to find the area of triangle CDE.



## Suggested Answers

1. When the pieces are cut out, the two triangles fit exactly into triangle CDE.

2. Use the method you found in Question 1 to find the area of triangle ABC in each of the following.



2. The cut-out and rearranged pieces are not shown here, but students should do this step.

a. The area of triangle ABC is half the area of the rectangle. So, its area is 8 square units.

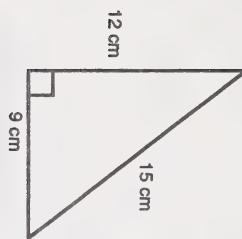
b. The area of triangle ABC is half the area of the rectangle. So, its area is 6 square units.

c. The area of triangle ABC is half the area of the rectangle. So, its area is 4 square units.

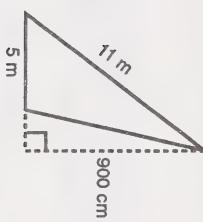
## Practice Activities

1. Use a formula to calculate the area of each triangle.

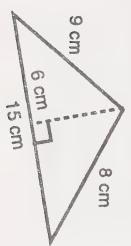
a.



b.



c.



## Suggested Answers

1. a.  $A = \frac{b \times h}{2}$

$$\begin{aligned} &= \frac{9 \times 12}{2} \\ &= 54 \end{aligned}$$

The area is  $54 \text{ cm}^2$ .

b.  $A = \frac{b \times h}{2}$

$$\begin{aligned} &= \frac{5 \times 11}{2} \\ &= 27.5 \end{aligned}$$

The area is  $27.5 \text{ m}^2$ .

c.  $A = \frac{b \times h}{2}$

$$\begin{aligned} &= \frac{15 \times 6}{2} \\ &= 45 \end{aligned}$$

The area is  $45 \text{ cm}^2$ .

2. Complete the chart for triangles.

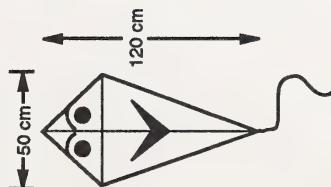
Base	Height	Area
a. 15 m	6 m	
b. 3.4 cm	5 cm	
c. 9 m	900 cm	
d. 40 mm	5 cm	
e. 4 cm	6 cm	

Note the different units.

2.

Base	Height	Area
a. 15 m	6 m	45 m <sup>2</sup>
b. 3.4 cm	5 cm	8.5 cm <sup>2</sup>
c. 9 m 900 cm	9 m 900 cm	40.5 m <sup>2</sup> 405 000 cm <sup>2</sup>
d. 40 mm 4 cm	50 mm 5 cm	1000 mm <sup>2</sup> 10 cm <sup>2</sup>
e. 4 cm	6 cm	12 cm <sup>2</sup>

3. Calculate the area of the kite shown.



$$\begin{aligned}
 3. \quad A &= \frac{b \times h}{2} \\
 &= \frac{120 \times 25}{2} \\
 &= 1500
 \end{aligned}$$

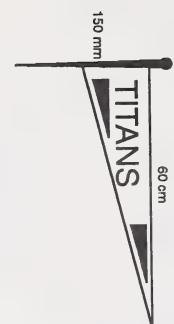
Each triangle has an area of 1500 cm<sup>2</sup>.

The area of the kite is 3000 cm<sup>2</sup>.

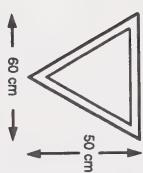
There are two congruent triangles.



4. How much felt is needed to make 30 pennants?



5. Calculate the area of the traffic sign.



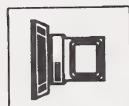
$$5. \quad A = \frac{b \times h}{2}$$

$$= \frac{60 \times 50}{2}$$

$$= 1500$$

The area is  $1500 \text{ cm}^2$ .

### Computer Alternative



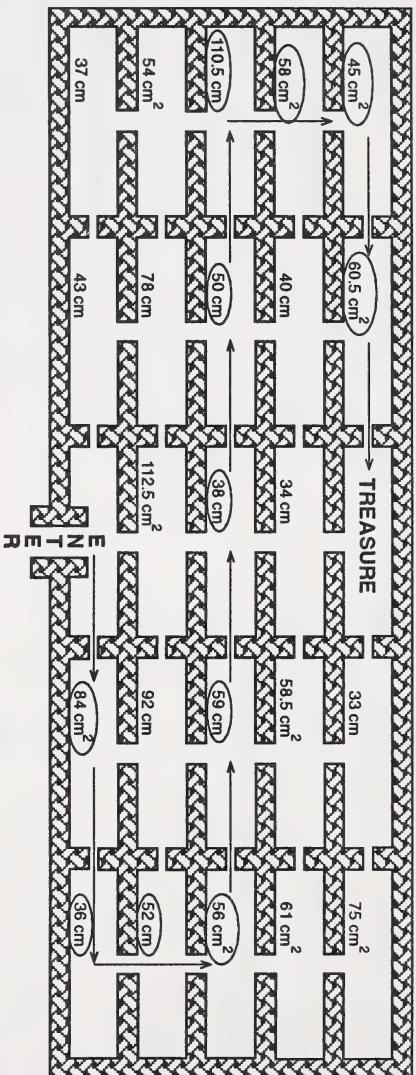
6. Do Lesson Series E in *Geometric Concepts/Area*.

### **Extra Practice**

Do the puzzle on the following page.<sup>1</sup>

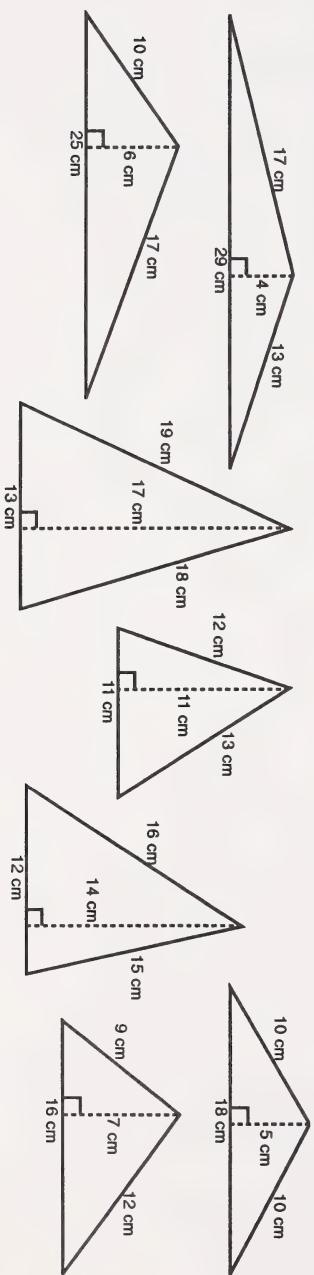
### **Suggested Answers**

See the following pages for answers.

**Maze Daze**

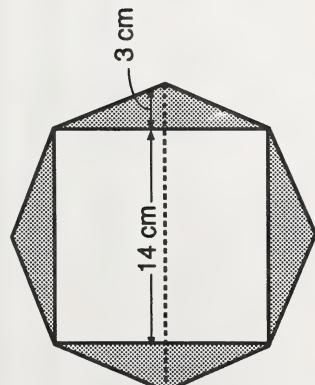
Each room in this maze contains a measurement. Fourteen of these measurements are the areas and perimeters of the seven triangles below. Figure out the area and perimeter of any triangle and find the answers in the maze. Circle the answers.

Keep working until you can draw a path to the treasure room that goes only through rooms containing correct answers. (It might not go through all of the correct answers.)



## Concluding Activities

1. Find the area of the shaded part of the regular octagon.



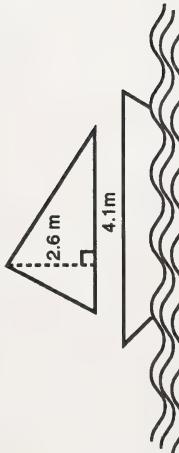
1. Each of the four triangles has the same area.

$$\begin{aligned} A &= \frac{b \times h}{2} \\ &= \frac{14 \times 3}{2} \\ &= 21 \end{aligned}$$

Each triangle has an area of  $21 \text{ cm}^2$ .

The shaded part has an area of  $84 \text{ cm}^2$ .

2. Calculate the area of the sail.



$$\begin{aligned} 2. \quad A &= \frac{b \times h}{2} \\ &= \frac{4.1 \times 2.6}{2} \\ &= 5.33 \end{aligned}$$

The area of the sail is  $5.33 \text{ m}^2$ .

3. Mr. Rawlins has a flower bed shaped like an isosceles right triangle in the corner of his lot. Find the area if the sides measure 2.4 m, 2.4 m, and 3.4 m.

$$\begin{aligned} 3. \quad A &= \frac{b \times h}{2} \\ &= \frac{3.4 \times 2.4}{2} \\ &= 8.16 \end{aligned}$$

The area is about  $8.2 \text{ m}^2$ .

4. What happens to the area of a triangle under the following conditions?

- a. the height is doubled
- b. the base is doubled
- c. both the base and the height are doubled
- d. both the base and the height are tripled

4. a. The area of the triangle is double the original area.  
b. The area of the triangle is double the original area.  
c. The area of the triangle is quadruple the original area.  
d. The area of the triangle is nine times the original area.

## AREA OF TRAPEZOIDS

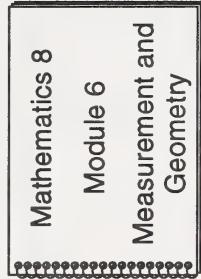
### What Lies Ahead

In this section the student will learn this skill.

- using a formula to determine the area of a trapezoid

### Gathering Materials

For this section the student needs these items.



scissors

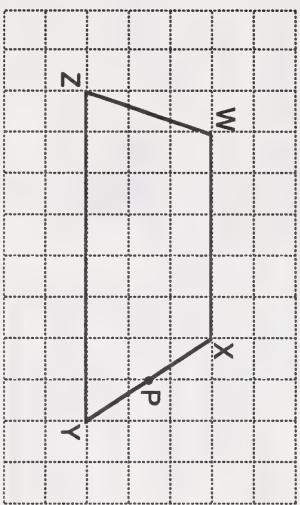


### Guiding the Student

- Emphasize to the students the goal of this section.
- Help the students decide what to do in this section.
- Help the students check their answers to the activities in this section and correct any errors.

## Introductory Activities

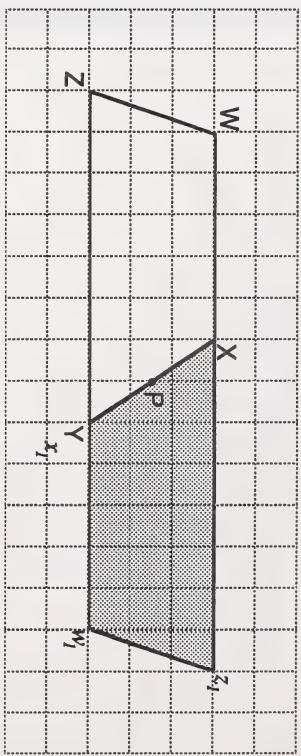
1. Draw the following trapezoid on a piece of grid paper and then find the half turn image about point P.



- What does the combination of the two figures (original trapezoid and image) look like?
- How do you find the area of this shape?

## Suggested Answers

1. This shows the trapezoid and its half-turn image.



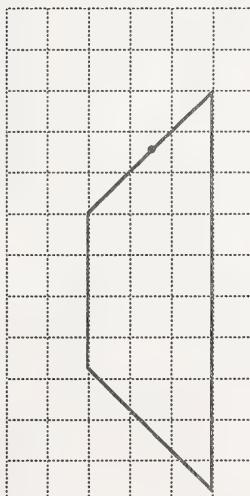
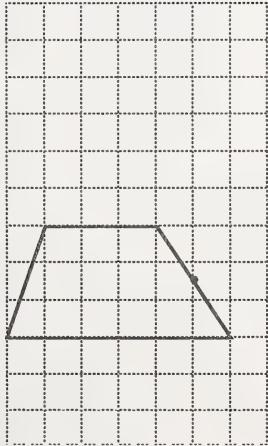
- You can find the area of a parallelogram by using this formula:
- The two figures look like a parallelogram.

$$\begin{aligned} A &= b \times h \\ &= 13 \times 3 \\ &= 39 \end{aligned}$$

The area of the parallelogram is 39 square units.

- How is the area of the trapezoid related to this shape?
- The area of the trapezoid is half the area of the parallelogram formed.
- The area of the trapezoid is  $0.5 \times 39$  or 19.5 square units.

2. Use the method you discovered in Question 1 to find the area of these trapezoids.



2. The parallelograms that are formed by combining the trapezoids and their half-turn images are not shown, but students should do this step for each.

a. The area of the parallelogram formed is 33 square units.  
The area of the trapezoid is 16.5 square units.

b. The area of the parallelogram formed is 27 square units.  
The area of the trapezoid is 13.5 square units.

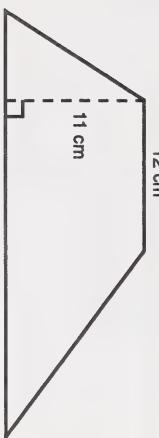
c. The area of the parallelogram formed is 42 square units.  
The area of the trapezoid is 21 square units.

## Practice Activities

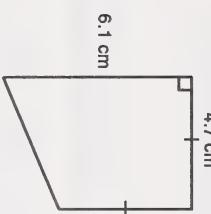
### Suggested Answers

1. Use the formula to find the areas of these trapezoids.

a.



b.



2. Find the area of the sign.



$$\begin{aligned} \text{1. a. } A &= \frac{h(b_1 + b_2)}{2} \\ &= \frac{11(34 + 12)}{2} \\ &= \frac{11 \times 46}{2} \\ &= 253 \end{aligned}$$

The area is  $253 \text{ cm}^2$ .

$$\begin{aligned} \text{b. } A &= \frac{h(b_1 + b_2)}{2} \\ &= \frac{4.7(6.1 + 4.7)}{2} \\ &\doteq 25.4 \end{aligned}$$

The area is  $25.4 \text{ cm}^2$ .

$$\begin{aligned} \text{2. } A &= \frac{h(b_1 + b_2)}{2} \\ &= \frac{25(46 + 64)}{2} \\ &= 1375 \end{aligned}$$

The area is  $1375 \text{ cm}^2$ .

3. Complete the chart for trapezoids.

3.

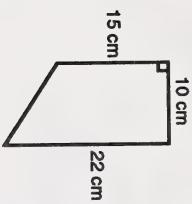
Height	Base1	Base2	Area
a. 6 cm	12 cm	10 cm	
b. 5.4 m	3.8 m	7.2 m	
c. 22 mm	3 cm	3.2 cm	
d. 5 m	4 m	6 m	

Height	Base1	Base2	Area
a. 6 cm	12 cm	10 cm	66 cm <sup>2</sup>
b. 5.4 m	3.8 m	7.2 m	29.7 m <sup>2</sup>
c. 2.2 cm	3 cm	3.2 cm	6.8 cm <sup>2</sup>
d.	5 m	4 m	25 m <sup>2</sup>

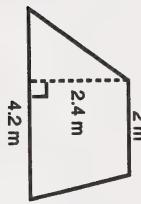
**Extra Practice**

Use a formula to find the area of each trapezoid.

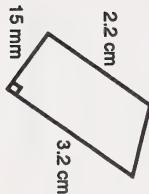
1.



2.



3.

**Suggested Answers**

$$1. \quad A = \frac{h(b_1 + b_2)}{2}$$

$$= \frac{10(15 + 22)}{2}$$

$$= \frac{10 \times 37}{2}$$

$$= 185$$

The area is  $185 \text{ cm}^2$ .

$$2. \quad A = \frac{h(b_1 + b_2)}{2}$$

$$= \frac{2.4(4.2 + 2)}{2}$$

$$= \frac{2.4 \times 6.2}{2}$$

$$= 7.44$$

The area is about  $7.4 \text{ m}^2$ .

$$3. \quad A = \frac{h(b_1 + b_2)}{2}$$

$$= \frac{15(2.2 + 3.2)}{2}$$

$$= \frac{1.5 \times 5.4}{2}$$

$$= 4.05$$

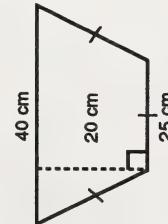
$\brace{15\text{mm} = 1.5\text{cm}}$

The area is about  $4.1 \text{ cm}^2$ .

## Concluding Activities

### Suggested Answers

1. Mr. Williams has a flower pot that looks like a trapezoid from one end. Find the area of the end of the flower pot.



2. a. The top of a triangle was cut off. Find the area of the part that remains.

b. If the area of the original triangle was  $180 \text{ cm}^2$ , find the height ( $h$ ) of the triangle that was cut off.

$$\begin{aligned} 1. \quad A &= \frac{h(b_1 + b_2)}{2} \\ &= \frac{20(25 + 40)}{2} \\ &= \frac{20 \times 65}{2} \\ &= 130 \end{aligned}$$

The area of the end of the flower pot is  $130 \text{ cm}^2$ .

2. a. The pot that remains is a trapezoid.

$$\begin{aligned} A &= \frac{h(b_1 + b_2)}{2} \\ &= \frac{12(16 + 8)}{2} \\ &= \frac{12 \times 24}{2} \\ &= 144 \end{aligned}$$

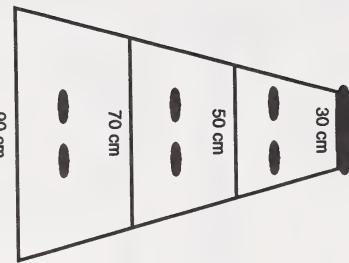
The area of the trapezoid is  $144 \text{ cm}^2$ .

b. If the area of the triangle that was cut off is  $180 - 144 = 36 \text{ cm}^2$ , find the height ( $h$ ) of the triangle that was cut off.

$$\begin{aligned} A &= \frac{b \times h}{2} \\ 36 &= \frac{8 \times h}{2} \\ h &= 9 \end{aligned}$$

The height is 9 cm.

3. The side of a vaulting horse for gymnastics is shaped like a trapezoid. It is made up of three sections that lock together. Each section is 40 cm high.



a. Find the area of each section.

b. What is the total area of the side of the vaulting horse?

$$\begin{aligned}
 3. \quad \text{a. } A &= \frac{h(b_1 + b_2)}{2} \\
 &= \frac{40(30 + 50)}{2} \\
 &= \frac{40 \times 80}{2} \\
 &= 1600
 \end{aligned}$$

The area of the top section is  $1600 \text{ cm}^2$ .

$$\begin{aligned}
 A &= \frac{h(b_1 + b_2)}{2} \\
 &= \frac{40(50 + 70)}{2} \\
 &= \frac{40 \times 120}{2} \\
 &= 2400
 \end{aligned}$$

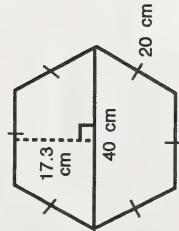
The area of the middle section is  $2400 \text{ cm}^2$ .

$$\begin{aligned}
 A &= \frac{h(b_1 + b_2)}{2} \\
 &= \frac{40(70 + 90)}{2} \\
 &= \frac{40 \times 160}{2} \\
 &= 3200
 \end{aligned}$$

The area of the bottom section is  $3200 \text{ cm}^2$ .

b. The total area is  $7200 \text{ cm}^2$

4. Find the area of this hexagon.



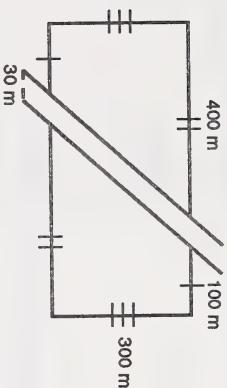
4. The hexagon is made of two trapezoids.

$$\begin{aligned}A &= \frac{h(b_1 + b_2)}{2} \\&= \frac{17.3 \times (40 + 20)}{2} \\&= \frac{17.3 \times 60}{2} \\&= 519\end{aligned}$$

The area of each trapezoid is  $519 \text{ cm}^2$ .

So, the area of the hexagon is  $2 \times 519$  or  $1038 \text{ cm}^2$ .

5. A highway was built through Mr. Ingram's farm, dividing one of his fields as illustrated.



a. Find the area of one of the resulting fields (they're both the same).

$$\begin{aligned} \text{b. } A &= bh \\ &= 530 \times 300 \\ &= 159\,000 \end{aligned}$$

The original field had an area of  $159\,000 \text{ m}^2$ .

b. What was the area of the original field?

c. How much land did he lose to the highway?

$$\begin{aligned} \text{c. } 159\,000 - 2 \times 75\,000 \\ &= 159\,000 - 150\,000 \\ &= 9000 \end{aligned}$$

Mr. Ingram lost  $9000 \text{ m}^2$  to the highway.

$$\begin{aligned} \text{5. a. } A &= \frac{h(b_1 + b_2)}{2} \\ &= \frac{300 \times (100 + 400)}{2} \\ &= \frac{300 \times 500}{2} \\ &= 75\,000 \end{aligned}$$

Each field has an area of  $75\,000 \text{ m}^2$ .

## AREA OF CIRCLES

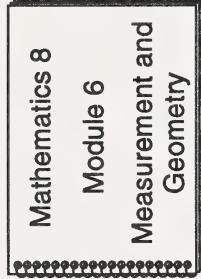
### What Lies Ahead

In this section the student will learn this skill.

- using a formula to determine the area of a circle

### Gathering Materials

For this section the student needs these items.



scissors

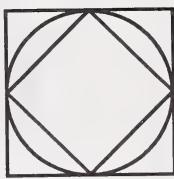


### Guiding the Student

- Emphasize to the students the goal of this section.
- Help the students decide what to do in this section.
- Help the students check their answers to the activities in this section and correct any errors.

**Introductory Activities****Suggested Answers**

1. In the following diagram the diameter of the circle is 2 cm, the sides of the larger square are 2 cm, and the sides of the smaller square are 1.4 cm.



a. Calculate the area of the larger square.

$$\begin{aligned}1. \quad a. \quad A &= b \times h \\&= 2 \times 2 \\&= 4\end{aligned}$$

The area of the larger square is  $4 \text{ cm}^2$ .

b. Calculate the area of the smaller square.

$$\begin{aligned}b. \quad A &= b \times h \\&= 1.4 \times 1.4 \\&= 1.96\end{aligned}$$

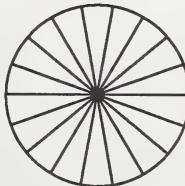
The area of the smaller square is about  $2 \text{ cm}^2$ .

c. Estimate the area of the circle.

c. The area of the circle is between  $2 \text{ cm}^2$  and  $4 \text{ cm}^2$ .

2. Use your compass to draw a large circle. The radius should be at least 8 cm.

Use your protractor to divide the circle into 18 equal parts of  $20^\circ$ . Colour the bottom half of the circle.



Now cut out the parts and reassemble them like this.



a. Calculate the area of the parallelogram formed.

b. How are the parts of the parallelogram and circle related?

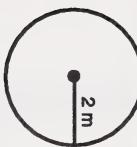
c. What is the area of the circle?

2. a. Measure the parallelogram and use the formula  $A = b \times h$ .  
Answers will vary, depending on the size of the circle.  
b. The height of the parallelogram is equal to the radius of the circle.  
The base of the parallelogram is half the circumference of the circle.  
c. The circle will have the same area as the parallelogram.  
Answers will vary, depending on the size of the circle.

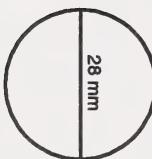
**Practice Activities**

1. Use a formula to calculate the area of the following circles to the nearest tenth.

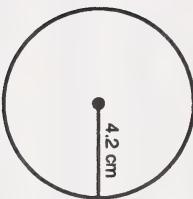
a.



b.



c.



The area is about  $12.6 \text{ m}^2$ .

**Suggested Answers**

1. a.  $A = \pi r^2$   
 $\doteq 3.14 \times 2^2$   
 $\doteq 3.14 \times 4$   
 $\doteq 12.6$

b.  $A = \pi r^2$   
 $\doteq 3.14 \times 14^2$   
 $\doteq 3.14 \times 196$   
 $\doteq 615.4$

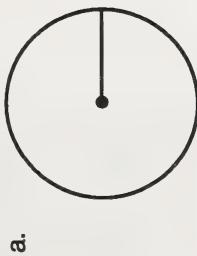
$r = \frac{1}{2}d$

The area is about  $615.4 \text{ mm}^2$ .

c.  $A = \pi r^2$   
 $\doteq 3.14 \times 4.2^2$   
 $\doteq 3.14 \times 17.64$   
 $\doteq 55.4$

The area is about  $55.4 \text{ cm}^2$ .

2. Measure the radius of the circles in millimetres. Use the formula to calculate the areas to the nearest tenth.



2. a.  $r = 15 \text{ mm}$

$$\begin{aligned} A &= \pi r^2 \\ &\doteq 3.14 \times 15^2 \\ &\doteq 706.9 \text{ mm}^2. \end{aligned}$$

b.  $r = 9 \text{ mm}$

$$\begin{aligned} A &= \pi r^2 \\ &\doteq 3.14 \times 9^2 \\ &\doteq 254.5 \text{ mm}^2. \end{aligned}$$

3. A circular table has a diameter of 1.4 m. Find the area of the table top to the nearest tenth.

$$\begin{aligned} A &= \pi r^2 \\ &\doteq 3.14 \times 0.7^2 \\ &\doteq 1.5 \text{ m}^2 \end{aligned}$$

4. How much greater is the area of a quarter than the area of a dime?

4. A quarter has a diameter of 2.3 cm and a dime has a diameter of 1.8 cm.

$$\begin{aligned} A &= \pi r^2 \\ &\doteq 3.14 \times (1.15)^2 \\ &\doteq 4.2 \\ A &= \pi r^2 \\ &\doteq 3.14 \times (0.9)^2 \\ &\doteq 2.5 \end{aligned}$$

$$4.2 - 2.5 = 1.7$$

The area of the quarter is  $1.7 \text{ cm}^2$  greater.

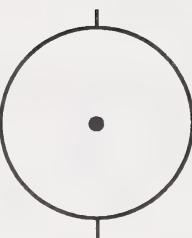
5. Estimate the areas of the circles which have the following radii.

- a. 10 cm
- b. 6 cm
- c. 20 m

6. A face-off circle has a radius of 4.5 m. Find its area.

- 5. Estimates will vary. The exact answers are given.
- a.  $314 \text{ cm}^2$
- b.  $113 \text{ cm}^2$
- c.  $1256 \text{ m}^2$

6.  $63.6 \text{ m}^2$



7. A lawn sprinkler sprays water a distance of 3.2 m in all directions. Find the area of grass that will be watered.

$$\begin{aligned}7. \quad A &= \pi r^2 \\&\doteq 3.14 \times (3.2)^2 \\&\doteq 32.2\end{aligned}$$

The area watered is about  $32.2 \text{ m}^2$ .

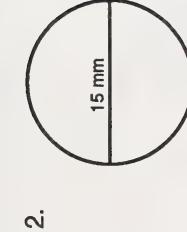


**Extra Practice**

Use the formula to calculate the area of each circle to the nearest tenth.

**Suggested Answers**

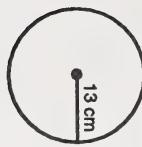
1.



2.

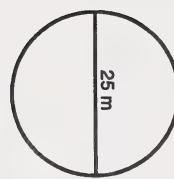
1.  $120.7 \text{ m}^2$
2.  $176.6 \text{ mm}^2$

3.



$$3. \quad 530.7 \text{ cm}^2$$

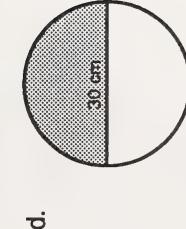
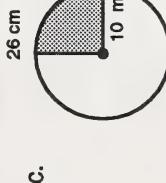
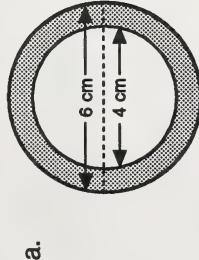
4.



$$4. \quad 490.6 \text{ m}^2$$

**Concluding Activities**

1. Calculate the areas of the shaded regions.

**Suggested Answers**

1. a. The larger circle has an area of  $28.3 \text{ cm}^2$ .  
The smaller circle has an area of  $12.6 \text{ cm}^2$ .  
The shaded area is  $15.7 \text{ cm}^2$ .

b. The square has an area of  $676 \text{ cm}^2$ .  
The circle has an area of  $530.7 \text{ cm}^2$ .  
The shaded area is  $145.3 \text{ cm}^2$ .

c. The circle has an area of  $314 \text{ m}^2$ .  
The shaded area is  $\frac{1}{4}$  of the circle, so it has an area of  $78.5 \text{ m}^2$ .

d. The circle has an area of  $706.5 \text{ cm}^2$ .  
The shaded area is one-half of the circle, so it has an area of  $353.3 \text{ cm}^2$ .

2. What is the best estimate of the area of a dime?

a.  $10 \text{ mm}^2$

b.  $30 \text{ mm}^2$

c.  $300 \text{ mm}^2$



3. What is the best estimate of the area of a record?

a.  $45 \text{ cm}^2$

b.  $200 \text{ cm}^2$

c.  $700 \text{ cm}^2$



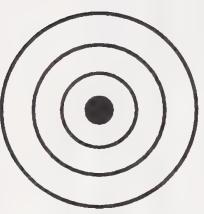
3.  $700 \text{ m}^2$

4. What is the best estimate of the area of an archery target?

a.  $1000 \text{ cm}^2$

b.  $10\,000 \text{ cm}^2$

c.  $1\,000\,000 \text{ cm}^2$



4.  $10\,000 \text{ cm}^2$

5. Which gives you more pizza, two 20-cm pizzas or one 30-cm pizza?



5. One 30-cm pizza gives you more.

6. The signal from a radio station transmitter can be received at locations 150 km away. Find the maximum area served by the radio station.

7. a. What happens to the area of a circle when its radius is doubled?

b. What happens to the area of a circle when its radius is tripled?

6.  $70\ 686 \text{ km}^2$

7. a. Its area is quadruple the original area.

b. Its area is nine times the original area.

8. A circular coffee table is made from oak veneer glued to a 2-cm thick plywood base. The veneer costs \$48.75/m<sup>2</sup> and the plywood costs \$10.95/m<sup>2</sup>. The table has a diameter of 0.8 m.

a. What is the area of the table top? (Round to the nearest tenth.)

b. What is the cost of the veneer used to make the table top?

c. What is the cost of the plywood used?

d. If the table top is cut from a 1 m<sup>2</sup> piece, what is the value of the wasted veneer.

e. What is the value of the wasted plywood under the same circumstances?

8. a.  $0.5 \text{ m}^2$

b. \$24.38

c. \$5.48

d. \$24.38

e. \$5.48

## VOLUME OF RIGHT RECTANGULAR PRISMS

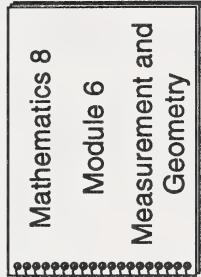
### What Lies Ahead

In this section the student will learn this skill.

- using a formula to find the volume of right rectangular prisms and cubes

### Gathering Materials

For this section the student needs these items.



base 10  
blocks



MATHWAYS: Volume  
(optional)

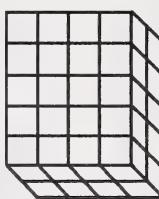
### Guiding the Student

- Emphasize to the students the goal of this section.
- Help the students decide what to do in this section.
- Help the students check their answers to the activities in this section and correct any errors.

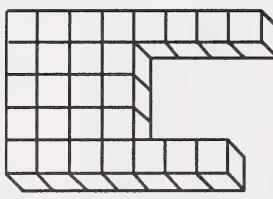
**Introductory Activities****Suggested Answers**

1. Find the volume of the following solids. You may use base 10 blocks or sugar cubes to construct the solids first.

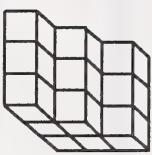
a.



b.

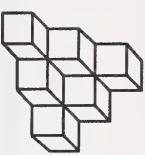


c.



c. 18 cubic units

d. 10 cubic units



2. Use twelve base 10 blocks or sugar cubes for this question.

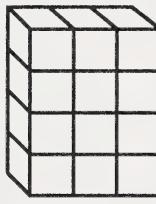
- Stack the cubes to form a rectangular prism with one layer.



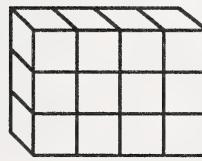
2. a.



b.



c.



d.



e.

3. What is the volume of each of the rectangular prisms in Question 2?

3. a. 12 cubic units  
b. 12 cubic units  
c. 12 cubic units  
d. 12 cubic units  
e. 12 cubic units

4. Use base 10 blocks or sugar cubes for this question.

a. What is the volume of this right rectangular prism?



b. How can you find the volume of this right rectangular prism without counting each block? What is it?



c. How can you find the volume of this right rectangular prism without counting each block? What is it?

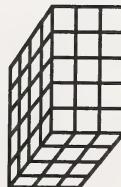
4. a. 5 cubic units

b. You can find the volume by multiplying the number of blocks in one row by the number of rows.

20 cubic units

c. You can find the volume of one layer by multiplying the number of blocks in one row by the number of rows. You can find the total volume by multiplying the number of layers by the volume of one layer.

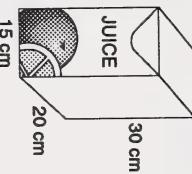
60 cubic units



## Practice Activities

Calculate the volume of each of the following right rectangular prisms using a formula.

1.



2.



3.



$$\begin{aligned} 1. \quad V &= l \times w \times h \\ &= 15 \times 20 \times 30 \\ &= 9000 \end{aligned}$$

The volume is  $9000 \text{ m}^3$ .

$$\begin{aligned} 2. \quad V &= l \times w \times h \\ &= 0.5 \times 32 \times 0.6 \\ &= 9.6 \end{aligned}$$

The volume is  $9.6 \text{ m}^3$ .

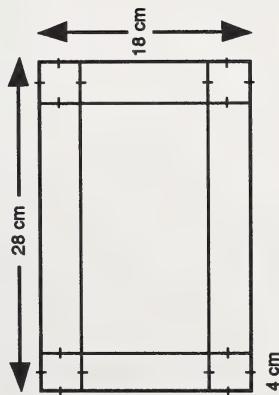
$$\begin{aligned} 3. \quad V &= l \times w \times h \\ &= 5 \times 2 \times 2 \\ &= 20 \end{aligned}$$

The volume is  $20 \text{ m}^3$ .

## Suggested Answers

## Concluding Activities

A pan is made from a rectangular sheet of metal as shown.  
Squares are cut out of each corner and the sides are folded up.  
What is the volume of the pan?



$$\begin{aligned}V &= l \times w \times h \\&= 20 \times 10 \times 4 \\&= 800\end{aligned}$$

The volume is  $800 \text{ cm}^3$ .

## Suggested Answers



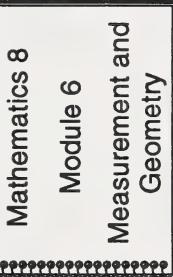
## SUMMARY

### What Lies Ahead

In this section the student will review the concepts that were learned in Part Two.

### Gathering Materials

For this section the student needs these items.



ruler

### Guiding the Student

- Emphasize to the students the goal of this section is to review Part Two.

- Help the students check their answers to the pretest in Section 12 and correct any errors.



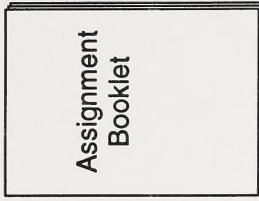
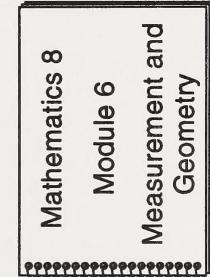
## MODULE CONCLUSION

### What Lies Ahead

The student is now ready to do the assignment in the Assignment Booklet. The student will be graded on the work done in this booklet.

### Gathering Materials

The student will need the following items.



### Guiding the Student

- Have the student complete the module assignment independently. The student may use resource material, but cannot get help. The student should attempt all parts of the assignment.

- Afterwards, you should both complete the declaration. You should submit the Assignment Booklet for a grade and feedback.





